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Bell Scientist Believes IBM To Offer Unix

By Jeffery Beeler
CW West Coast Bureau

SANTA MONICA, Calif. — IBM plans eventually to add a Unix-based operating system to its family of large-scale mainframes, according to a Bell Laboratories employee who has worked closely with the industry giant on software-related projects.

The exact nature of the prospective Unix-based product has yet to be revealed, but the operating system developed by Western Electric Co. has definitely caught IBM's eye. So says Bell Labs' technical services manager, Steven Buroff, who spoke last week at a Unix users group meeting sponsored by the Usenix Association.

Buroff credited his organization with transporting the operating system to IBM's 370 architecture-based processors. Bell's experiments in

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Mini Makers Boost 32-Bit Options

• DG Goes Real-Time • DEC Tops Off VAX

By Lois Paul
CW Staff

WESTBORO, Mass. — Data General Corp. announced a 32-bit real-time operating system for its Eclipse MV line of minicomputers last week.

The vendor described the Advanced Operating System/Real-Time 32-bit (AOS/RT32) as a multitasking, multiprocessing operating system designed for users of the firm's Eclipse MV/8000 and MV/6000 minicomputers which run dedicated applications requiring real-time processing and high throughput. It provides an upgrade path for users of DG's 16-bit Eclipse S/140 and Nova systems, both running under Rdos, the vendor said.

Although it was "built from the ground up," AOS/RT32 is a subset of AOS/VS, DG's time-sharing operating system for the MV family. DG claimed to be the only company offering this combination of a 32-bit dedicated real-time operating system and a compatible, general-purpose virtual operating system for the same computer.

The vendor described AOS/RT32 as a "streamlined version" of AOS/VS for runtime operations, noting that users can employ AOS/VS to write and test applications

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By Tim Scannell
CW Staff

MAYNARD, Mass. — Digital Equipment Corp. today unveiled a high-end 32-bit VAX-11 superminicomputer that it said is up to 80% more powerful than the top-of-the-line VAX-11/780.

The VAX-11/782 is a tightly coupled asymmetric multiprocessing system that incorporates two Model 780 processors and a DEC MA780 shared memory subsystem. The system is geared for computer-intensive applications such as structural analysis, electronic and mechanical design with interactive graphics, high-speed data analysis and large-scale financial modeling, a spokesman said.

The 782 was also designed to accommodate long computational runs and concurrent interactive terminal use, he added.

Basically described as a "supercharged" VAX-11/780, the new machine has a maximum complement of 8M bytes of error-correcting code memory and can accommodate all VAX options and peripherals such as the FP780 floating-point processor; RP07, RM05 and RM80 disk drives; and DEC alphanumeric and CRT terminals.

The 782 is fully software-compatible with DEC's VAX/VMS operating system, a single copy of which is shared by both system processors.

The multiprocessing operation of the 782 is reportedly visible only during system initialization and is transparent to programming and users. Because the system uses a single set of mass storage peripherals and a single copy of VAX/VMS, the system does not require duplicate files or

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Could Involve Other Users

Wang User Weighing Pursuit of Lawsuit

By Tim Scannell
CW Staff

NANTUCKET, Mass. — A disgruntled user here will decide within the next few weeks whether to continue pressing a \$200,000 suit charging Wang Laboratories, Inc. with negligence, selling defective equipment and breach of implied warranties.

If the suit goes to trial — scheduled for May — it could eventually involve scores of users throughout the Northeast who are reportedly having problems with Wang hardware (see box on Page 8).

The suit was filed in 1979 by The Albert G. Brock Co., Inc., which bought a Wang 2200T in late 1977 to

manage its accounting, claims control and word processing. Brock, a small insurance firm that services clients on Nantucket Island, also named in its suit Xerox Corp., the manufacturer of the Wang system's Series 40 disk drive.

According to the suit, the Brock Co. claims that after more than two years of service calls and even an equipment swap, Wang was unable to locate and fix a relatively simple problem that was eventually traced to the system's processor and repaired by a third-party service technician in about an hour.

However, in a prepared statement issued last week, Wang denied the

system was defective and blamed the firm's alleged computer problems on "factors beyond the control of Wang. Among which were unique electrical problems at Brock's place of business

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Xerox Alters Its Ethernet Specs To Conform to IEEE 802 Standard

By Bruce Hoard
CW Staff

PALO ALTO, Calif. — Xerox Corp. has for the first time altered its Ethernet local-area network specifications to conform with the emerging IEEE

802 local-area network standard.

David E. Liddle, Xerox Office Products Division vice-president, disclosed that information during an interview last week focusing on charges that Ethernet is unsafe. The charges were made recently by Tom Phinney, IEEE local network standards committee member [CW, Jan. 25].

Referring to the tentative 802 standard for carrier sense multiple access with collision detection (CSMA/CD), Phinney had said, "There is more attention to safety in this standard than there is in Ethernet." Of Ethernet, he had gone on to say, "There are concerns about failure modes that cause current to be shunted from a drop cable up to the main cable and back down the adjacent drop cables and can give a secretary with an open-toed shoe a substantial jolt."

Liddle admitted that the way the grounding scheme is described in the "Blue Book" Ethernet specification "is not as precise as it should have been." The Blue Book specifica-

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Did You Say 'Rabbit' Three Times?

By Lois Paul
CW Staff

DETROIT — Quick, say "Rabbit, rabbit, rabbit."

Since this is the first day of a month that contains an R, you have just participated in a bit of folklore — one of the 16,000-plus superstitions that an American literature professor here has included in a computerized data base.

The University of Detroit's James T. Callow has been compiling bits of

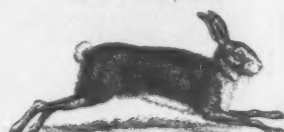
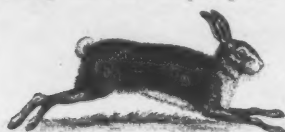
superstition and folklore since 1964, starting first with a manual card file and, more recently, putting the extensive collection on the university's Burroughs Corp. B6800 computer system.

Callow explained that the chanting of "rabbit, rabbit, rabbit" on the first day of a month that includes an R is a game that involves quickness, as the goal is to be the first person to say the words. He related a tale in which a man got out of bed on the first day

of the month and, confident he had beaten his wife to the chant, said the three magic words in succession. However, when he went to his dresser to get a shirt, he found a slip of paper with the words written on it — in his wife's handwriting.

After an item on this superstition appeared in a newspaper, Callow received a letter from a senator from Maine who said he had been playing that game for years. "We haven't

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Honeywell Vice-President Denies Rumor That Firm Will Stop Developing Multics

By Robert Batt

CW West Coast Bureau

PHEONIX — Rumors that Honeywell, Inc. will scratch its widely used Multics operating system were firmly scotched by a senior company official here.

Deward Manzer, vice-president and general manager of Honeywell's Large Information Systems Division, said rumors that Multics would be discontinued after the next release (Release 10) were "without substance."

Asked if this was a categorical denial of the rumors that Honeywell would scrap Multics, Manzer replied in the affirmative. "And if you were to tour our facilities," he added, "you would see the developments we are making with Multics."

Interactive processing together with security were the original design goals of the Multics operating software. Its chief claim to fame is that it offers a variety of on-line activities, including batch processing, remote job entry, transaction processing and time-sharing.

Together with Honeywell's Gcos, Multics provides such programming

tools as industry-standard compilers, on-line diagnostics and conversion programs.

Rumors Surface

Rumors that Multics was to be scrapped first surfaced last year with stories of internal memos circulating around the company's Phoenix and Cambridge, Mass., plants proclaiming the end of the operating system after Release 10. The announcement was never made public, however; and further confusion arose when Steve Jerritts, president of Honeywell Information Systems, Inc., omitted reference to the future development of Multics after Release 10 when he addressed a users group meeting in Los Angeles.

Shortly after Jerritts' speech, Honeywell announced Release 9 of the Multics operating system.

In Phoenix last week, discussing the company's strategy for software over the next few years, Manzer said that Honeywell plans to develop products around Multics, Gcos and CP-6, an interactive operating system evolved from the former Xerox Corp. CP-V system. He indicated that most

of the resources would go into Gcos.

"Our strategy is to exploit the productive capabilities of these operating systems and to extend them, particularly Gcos, into the distributed processing environment," Manzer said.

Large investments, Manzer said, will be made to develop networking systems with high transaction processing capabilities so that the company's larger machines can cooperate with the vast array of smaller systems, such as minis.

It was for this reason, he argued, that Honeywell established a new Network Management Systems Division incorporating minicomputers, mainframes, terminals and communications equipment. The division started operations Jan. 1.

Manzer said that huge investments would be needed in software to take advantage of multiprocessing architecture, and Honeywell, he claimed, has developed a "total technology plan" to cater to these developments.

Manzer scoffed at suggestions that makers of IBM plug-compatible mainframes (PCM) are better placed to take advantage of industry developments than IBM's traditional competitors such as Honeywell, NCR Corp. and Burroughs Corp. The penetration of PCMs into the marketplace has, he claimed, not been as substantial as those companies specializing in plug-compatible subsystems such as Storage Technology Corp. and Magnetic Peripherals Corp. The latter is partly owned by Honeywell.

"Besides, the real fallacy in the PCM strategy is that they are not in control of their own destiny," he added. "If IBM evolves its products significantly in either software or firmware, they are dead-ended."

'History of Computing' Available

FRAMINGHAM, Mass. — Computerworld's 12-part series on the History of Computing is now available in reprint form. The series, which appeared bimonthly in the pages of CW late last year, painted a biographical portrait of the visionaries who shaped the destiny of the computer industry.

Researched and written by CW Writer/Analyst Marguerite Zientara, the series began with a look

at the life and times of Blaise Pascal and concluded with a glimpse into the future of technology.

The 56-page reprint is available for \$5; prepayment by check or money order is required. Quantity discounts are not available.

Requests for the reprint should be sent to Carol Audlee, CW Communications/Inc., 375 Cochituate Road, P.O. Box 880, Framingham, Mass. 01701.

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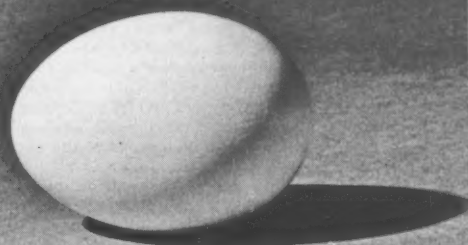
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But Many Questions Left Unanswered Congress Opens Hearings Into Bell Settlement

By Phil Hirsch
And Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Whether the "new" AT&T will use its revenues from long-distance service to secretly cross-subsidize its proposed on-line information services was one of several questions that remained unanswered last week, two days after Congress began delving into the proposed settlement of the government's antitrust suit against the phone company.

The unanswered questions indicated the great telecommunications policy debate is not over and may indicate that Congress is trying to delay acceptance by Judge Harold Greene of the agreement which Justice Department and AT&T lawyers negotiated last month. Greene, who presides over the trial, must approve the settlement before it can be implemented.

If the settlement implementation is delayed, that would mean further delay in innovative information services for many data communications users.

Separate hearings on the settlement agreement were conducted last week in the Senate by the Commerce and Judiciary Committees. And in the House of Representatives, the Telecommunications and Monopolies Subcommittees held a joint session. The Reagan administration's chief telecommunications adviser, Bernard J. Wunder Jr., told the Commerce Committee that the settlement is basically sound, although details re-

WASHINGTON, D.C. — By next Friday, the Department of Justice must publish a "competitive impact statement" describing why it sued AT&T under the Sherman Act and what the effects of the recently negotiated settlement will be on competition.

Also by next Friday, AT&T must disclose all communications, written or oral, which its attorneys and corporate officials had with government officials relevant to

main to be worked out. Specifically, he said, a more adequate definition of customer premises equipment is needed, and "there are some regulatory jurisdiction problems."

Possibly the most startling revelation to come out of the hearings was Assistant Attorney General William Baxter's statement that on Jan. 4, after terms of a settlement had been negotiated, he authorized AT&T officials, including Board Chairman Charles Brown, to clear the settlement with the White House and Defense Department. Sen. Arlen Specter (R-Pa.), a former Philadelphia district attorney and special assistant attorney general for the commonwealth of Pennsylvania, said he had "never seen a litigation where a lawyer sent the opposing side to see his client."

Baxter, the first witness to appear before the Judiciary committee, ex-

plained that he had authorized AT&T officials to carry the settlement agreement to the White House and the Defense Department because he had important commitments out of town and was "pressed for time."

But in answer to further questions from Specter, the assistant attorney general admitted that the time pressure was self-induced.

Not until that period ends will Greene begin considering whether

the settlement is in the public interest. Since Greene's order does not say how long he will take to consider the proposal, there is no way of knowing when the settlement — if approved — will be implemented. Assistant Attorney General William Baxter and AT&T Vice-President/General Counsel Howard Trienens have agreed that AT&T will reorganize itself within 18 months after the settlement becomes legally effective.

Baxter said he had decided, during the Christmas holiday, that it looked as if settlement of the government's antitrust suit against AT&T was imminent and that if a definitive agreement was worked out he would try to get it finalized as quickly as possible to reduce litigation costs. In answer to further questions from Specter, Baxter agreed that others within the Justice Department could have contacted the White House and the Defense Department. But he saw "no reason why AT&T couldn't do it, since the agreement by this time was in written form."

Long Lines Division

While the settlement's provision that AT&T divest its 22 operating companies is seen as reducing the phone company's opportunity for anticompetitive behavior, Rep. Edward Markey (D-Mass.) pointed out at the House hearing that its Long Lines Division remains a part of AT&T. He indicated that since the Long Lines Division handles better than 95% of the nation's long-distance communications traffic, most of its customers can't migrate if prices increase beyond costs to generate funds for cross-subsidizing AT&T's competitive services.

Markey thought last year's 30%-plus increase in Bell's private line rates were a good illustration of this point. He asked AT&T's Charles Brown whether the company has lost any customers as a result of the increase.

The answer was "yes," although Brown didn't know how many had migrated. He quickly added that Baxter, in testimony the previous day, had said that "cross-subsidy and monopoly power are not synonymous."

Sensitive Point

On another sensitive point — whether AT&T will continue licensing its patents on reasonable terms, as required by the 1956 consent decree — Brown said this policy would continue only until the proposed settlement agreement is accepted by Greene.

Rep. Thomas A. Luken (D-Ohio) asked Brown "whether we can determine what the [settlement agreement] will mean to the ratepayer" when the plan for reorganizing AT&T to implement the settlement hasn't yet been disclosed. Brown replied that the settlement agreement is "quite clear."

However, when Luken pointed out that no one knows what will happen to the present local-exchange subsidy and that the amount of that subsidy will affect the bond rating of each divested operating company, Brown agreed that "it will take a while to shake things out."

Earlier, Rep. Robert McClory (R-Ill.) suggested that the House hold another set of hearings after the reorganization plan is unveiled.

Rate Hikes?

Whether local telephone rates will go up received a lot of attention at all of the hearings. Baxter and Brown insisted that the settlement per se won't force rates up since state public utilities commissions retain authority to adjust access charges so they compensate for whatever the operating companies lose as a result of divestiture.

Moreover, the operating companies will continue receiving revenues from Yellow Pages advertising at a gradually declining rate during the next four years, Brown reported. He appeared to be responding to fears expressed by a number of legislators who feel that transferring Yellow Pages directories all at once from the operating companies to AT&T as allowed by the settlement agreement would threaten the financial underpinnings of local-exchange service.

Wunder told the Senate Commerce Committee, in response to a question from committee member Sen. John C. Danforth (R-Mo.) that the agreement between AT&T and the Justice Department resolves the dispute over whether the phone company should be allowed to offer unregulated data processing services. Once it divests the operating companies, said Wunder, AT&T will not be able to cross-subsidize unregulated computer services with revenues from its monopoly rate base.

On that subject, committee Chairman Sen. Bob Packwood (R-Ore.) noted that the new, smaller AT&T would have to compete with "any number of companies" that might be "significantly more liquid" in the data processing markets.

Baxter Tells Senate Committee Why U.S. Dropped IBM Lawsuit

WASHINGTON, D.C. — Although AT&T was the main subject of hearings in Congress last week, the Senate Judiciary Committee also spent some time on the Justice Department's decision to drop the IBM case.

Assistant Attorney General William Baxter admitted that some members of his staff strongly opposed the decision. But, he added, it was his choice to end the government's suit.

Asked by Sen. Howard Metzenbaum (D-Ohio) for copies of Justice Department staff memos commenting on the decision to drop the IBM case, Baxter initially refused to provide them. However, when Metzenbaum said he would be willing to accept the memos without the names of their authors, the assistant attorney general asked for time to consider the request.

In a prepared statement to the Judiciary Committee, Baxter said that after a lengthy review of the IBM case, he had concluded that it presented "very substantial problems." He pointed out that the government, in order to prove violation of the Sherman Act, had to define the market involved and defend this definition against IBM's challenge.

The definition the government came up with — "large general-purpose computers optimized for business use" — had become "increasingly troublesome as computer

systems became more powerful and were adapted to a greater variety of uses throughout the 1970s," Baxter said. The advent of distributed processing and introduction of micros added further complications.

"Perhaps the strongest evidence of predatory conduct on the part of IBM concerned the prices the company set in 1964 for the 360/90," Baxter added. "However... the 360/90 was not offered in the market we alleged to have been monopolized." While there was evidence of anticompetitive behavior in rushing the 360/67 to market, it was "much more ambiguous than... for the Model 90."

Another major basis for the government's charges was that IBM changed its computer system interfaces "in a manner intended to harm emerging competitors that offered peripheral... devices designed to be used with IBM systems." But this evidence posed difficulties because of the need to show that the interface changes were antitrust violations rather than design improvements.

"The fact that four peripheral manufacturers sued IBM themselves, on the basis of this evidence, and that IBM won all four suits, certainly dampened whatever confidence the [Justice Department] once had about prevailing on these episodes," Baxter said.

Bell Reassures Patent Licensees; CCIA Worried

By Bruce Hoard
CW Staff

Although the settlement reached in the U.S. vs. AT&T antitrust case no longer requires Bell to license its patents to other companies, the company will honor all existing patent licenses "for the life of the patent," a spokesman said last week.

But a leading industry group is afraid AT&T will refuse to renew patents in such high-growth areas as semiconductor and laser technology, creating a new monopoly for Western Electric, its equipment manufacturing arm.

The settlement effectively ending the seven-year-old U.S. vs. AT&T case no longer requires the scaled-down behemoth to license its patents to other companies as stipulated by the 1956 Consent Decree. The company currently has about 700 such patent licensing agreements.

While the statutory life of a patent is 17 years, "any existing patent agreement or patent license that is already there is good for the life of the patent," the Bell spokesman said in an interview. "So the existing agreements that we may have with other companies on our patents are not ended."

Patent licensing for future patents will depend on "a reasonable royalty" to be negotiated between Bell and the licensee, he said.

However, the spokesman did add, "We're not quite sure about what all the procedures are going to be because all the details of the divestiture plan haven't been worked out. But we don't anticipate that there's going to be very much of an immediate change at all."

The point at which AT&T will no longer be required to license its patents will occur as soon as U.S. District Court Judge Harold Greene enters a modification vacating the 1956 Consent Decree, the spokesman said. The judge intends to first conduct a 60-day public comment period during which opponents of the settlement may argue against it.

CCIA Fears

Despite the Bell spokesman's assurances, A.G.W. "Jack" Biddle, president of the Computer and Communications Industry Association (CCIA), fears Bell will shut off patent licensees. Asked about the licensees' future with Bell, Biddle, who has been testifying before congressional hearings on the Bell breakup, replied, "We have mixed input on that. Some companies have patents or licenses that are in perpetuity and others are [for] two or three [year] terms as we understand it."

He went on to say remarks made by AT&T Chairman Charles L. Brown at those same hearings led him to believe that Bell will attempt to reconfigure communications monopolies in the fashion Xerox Corp. has with copiers and IBM with computers.

The most chilling scenario he described involved semiconductor and laser technology. "If Bell in effect refused to renew its licenses with Texas Instruments [Inc.], Intel [Corp.] and others, the rest of the industry would have no other source of semiconductors in the future except Western [Electric], and that would be dis-

asterous," he declared.

President Howard Anderson of the Yankee Group, a research firm based in Cambridge, Mass., does not seem to believe Biddle any more than Biddle apparently believes Bell. "Remember for a moment that Biddle has a bias," he said. "His bias is that if things are copacetic, no one needs a lobbyist. I think he has overstated his case."

Anderson predicted that Bell licensees will not be cut off from Bell technology and added there will be a proliferation of *quid pro quo* cross-licensing agreements in which AT&T will license patents from the companies it is licensing.

Western Electric cannot use all the technology developed by Bell Lab-

oratories, Anderson said. And, he pointed out, in the past Bell Labs was funded by assessments from its operating companies. With that source gone, Bell Labs will have a "great need for money," he concluded.

"Can AT&T and Western Electric support the laboratories just on their own? I think it's too big a bite," he said, finishing his explanation of why it is in Bell's interest to continue licensing its technology.

If Bell does cut off its patents, the impact will be minimal in most cases, believes Jim Thompson, engineering manager with Infotron Systems Corp., a modem and multiplexer manufacturer. "Other companies make compatible products without the benefit of manufacturing infor-

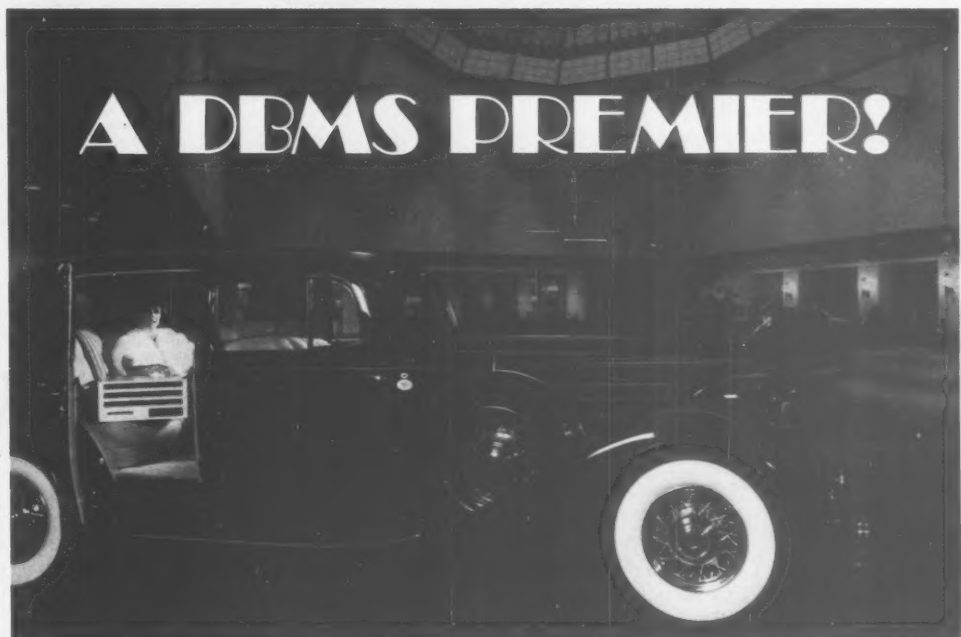
mation," he stated.

There are two reasons, according to Thompson, why a company might want to produce exact replicas of Bell products:

- If a manufacturer sells equipment to an independent telephone company such as Continental Telephone Co., the phone company may want exact duplicates in order to hold down training and support.

- Some companies who have on-line interfaces with the Bell system simply prefer to be as closely compatible as possible.

Thompson shed some light on the patent licensing procedure by recalling that Infotron paid about \$40,000 seven years ago to license a patent for Bell's Model 208 modem.



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DG Unveils 32-Bit Real-Time Operating System

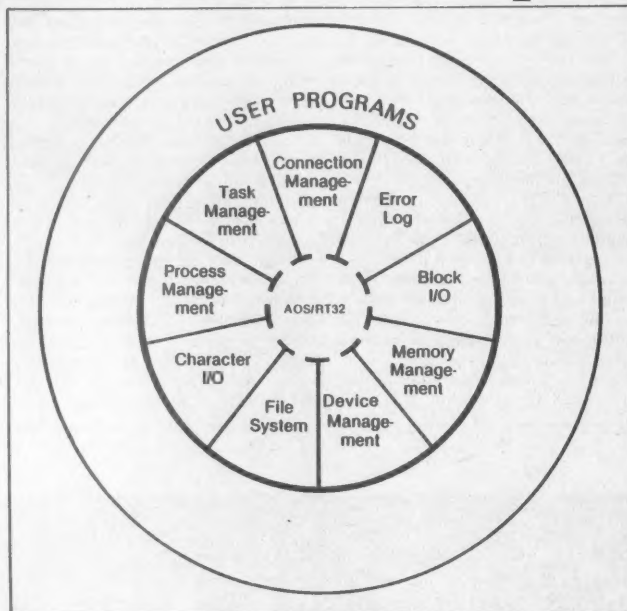
(Continued from Page 1)

that they can run in the real-time environment of AOS/RT32 on another MV machine.

The real-time operating system is intended to extend the application range of the Eclipse MV family to users who need a high degree of control over their applications, but who also want a comprehensive set of tools to help them get their products to market quickly. Typical applications include process control, automated test equipment, data acquisition, communications, computer-aided design and numerical control.

AOS/RT32 supports up to 64 parallel processes, each with as many as 32 tasks, the vendor said. Its design is modular, and independent subsystems include process management, memory management, task management, file system, block I/O, character I/O and peripheral management. This was intended to provide for "maximum user control" and easier configuration, as users can choose which of the modules will be needed and load only these segments.

AOS/RT32 uses the ring-oriented architecture of the Eclipse MV family, and this reportedly provides for minimal overhead incurred by context switching when processing a system call. More hardware resources, therefore, are available for



DG's AOS/RT 32

user applications.

The vendor said that fast I/O throughput is provided with AOS/RT32 because of memory-resident system data bases, I/O and computer

overlap and direct block I/O to data channel devices. The operating system is said to be priority-based, with the user given the ability to define his applications schedule policy explicitly and to execute the majority of the system on a priority basis.

AOS/RT32 reportedly supports the maximum physical memory avail-

able on an Eclipse MV family processor. System calls allow a process to manipulate its 512M-byte logical address space, which consists of 2K-byte pages that are either shared or unshared.

The operating system supports disks that may be formatted with standard AOS/VS utilities, the vendor said, or these may be left unformatted. Formatted disks can be accessed by AOS/RT32 or AOS/VS, allowing the same pack to be used by both systems.

The system can respond quickly to user device interrupts, DG said, because of its design criteria and the Eclipse MV architecture. System-supported devices are included in the operating system during system generation and user-supported devices are introduced at run-time.

AOS/RT32 supports Fortran 77, PL/I and Data General Language (DG/L) for the 32-bit Eclipse MV family. These share a common language runtime environment, permitting routines written in one language to be used by programs written in the others, the vendor said.

An initial license for the AOS/RT32 operating system without disk support is \$5,000; a subsequent license is available for \$3,000. For the AOS/RT32 operating system with disk support, an initial license is priced at \$5,500. The subsequent license fee is \$3,500. Delivery is 90 days after receipt of order, the vendor said from 4400 Computer Drive, Westboro, Mass. 01580.

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DEC Tops Off VAX Line

(Continued from Page 1)

processor synchronization for file access, explained Paul Chen, the 11/782's product manager.

The system can accommodate all standard VAX software, including Decnet-VAX, VAX-11 data base management system and Decmail. In addition, programs developed on other VAX systems can be run on the 782, Chen said.

A basic VAX-11/782 system includes the two processors, two MA780 shared-memory controllers with 2M bytes of memory, 124M bytes of disk storage, a TU78 magnetic tape drive, an eight-line asynchronous multiplexer, two LA120 Dec-

riter III console terminals and the VAX/VMS operating system. The system is priced from \$395,000, about 35% to 40% more than a single-processor VAX-11/780, DEC said.

Current VAX-11/780 users who want to upgrade to a dual-processor system can buy an upgrade option for their machines.

The upgrade kit consists of a 780 processor unit, two MA780 shared-memory controllers, 1M byte of memory, an LA120 console CRT terminal and associated cabinets and cabling. Prices for the upgrade option begin at \$180,000.

DEC is located at 146 Main St., Maynard, Mass. 01754.

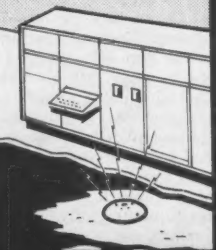
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Should Government Review Research?

Congressman Assails CIA Proposal as 'Paranoia'

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — A Central Intelligence Agency proposal to review unclassified research results in data processing, electronics and other high-technology fields before publication is symptomatic of Reagan administration "paranoia" about national security, a member of the House of Representatives' Science and Technology Committee charged last week.

Deputy CIA Director Adm. Bobby R. Inman's recent suggestion for a formal process of government review of such research [CW, Jan. 18] is another in a string of administration proposals to curtail the free flow of information in the name of national security, said Rep. George E. Brown Jr. (D-Calif.).

Brown, chairman of the House Science, Research and Technology Subcommittee, said the administration

has mounted "a concerted effort . . . to impose controls on the free flow of information from the government to the public as well as between scientists in the United States and those overseas."

Besides Inman's proposal, outlined before the recent annual meeting of the American Association for the Advancement of Science, Brown said the administration is also backing restrictive amendments to the Freedom of Information Act, has tried to limit press access to government information on what it considers sensitive topics and may seek enhanced authority to classify government information.

Brown also noted that the government has recently tried to limit meetings between foreign and American scientists and to restrict enrollment of foreign exchange students in certain types of university research programs.

Motivated by Self-Interest

Referring to Inman's statement that DP and computer science research publication contributes to Soviet military technology, Brown said Inman characterized scientists' arguments for free flow of information "as being motivated by self-interest, entirely disregarding the society's stake in this freedom." Brown said In-

man's proposal threatens U.S. leadership in data processing and communications.

"National security is too important to be left to security specialists alone," according to Brown, who said every new administration "inevitably goes through a phase of believing it is important to stem leaks of sensitive or embarrassing material, rather than dealing with the substance of the issue."

"While this is understandable," he said, "we must remain on guard because this administration, more than any other, stands a good chance of codifying this institutional paranoia into the laws of the land."

Unix Believed Alluring to IBM

(Continued from Page 1)

software portability have yielded a modified Unix operating system that has run successfully on several models of high-end IBM CPUs, including the 370/158, 4341 and 3033, Buroff said.

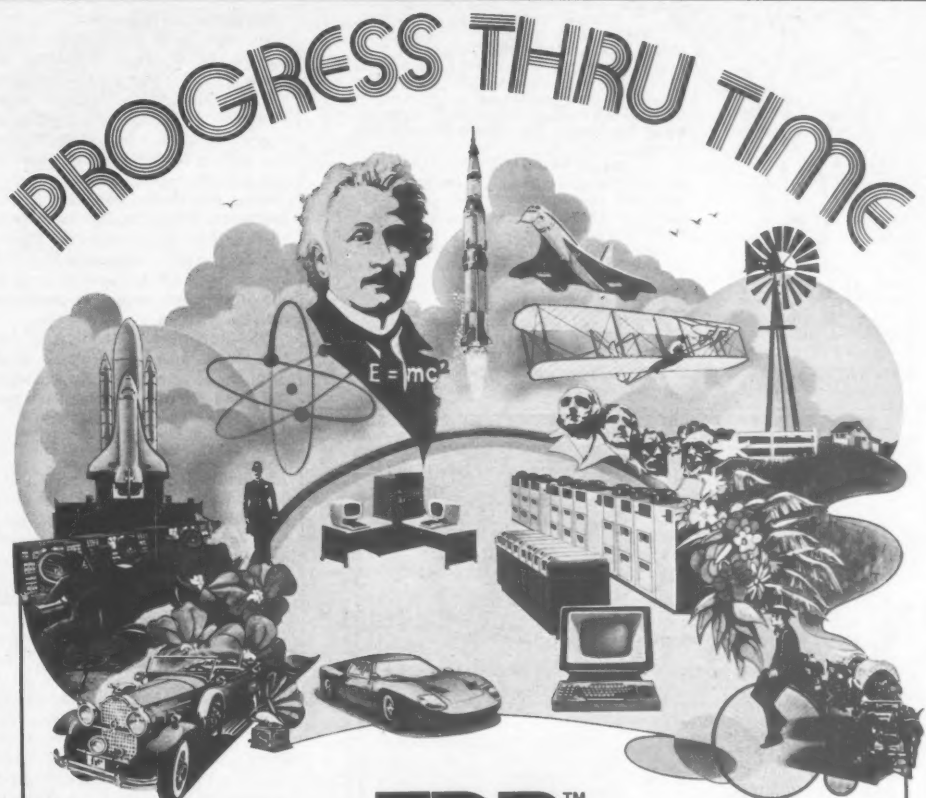
Half of Bell's Unix derivative consists of an existing "kernel," which Bell Labs has modified to suit the 370 architecture's special needs. The other half consists of a resident supervisor, which IBM itself developed by modifying one of its own mainframe software products — Time-Sharing System (TSS).

In addition to supplying the resident supervisor, the industry giant developed the software for a Series/1-based front-end processor that executes all the terminal functions for Bell's Unix-driven IBM hosts.

For Buroff, IBM's willingness to participate so strongly in Bell's software portability effort suggests the mainframe vendor intends someday to supply a 370-compatible Unix-based operating system of its own. Of all the IBM mainframes now running Bell's 370-compatible Unix look-alike, the largest to date is a 3033AP, which uses five Series/1s as front ends and simultaneously supports 180 to 200 users. Like the other IBM processors involved in Bell's portability experiments, the 3033AP uses Unix 3.0 as its operating system kernel, Buroff said.

Why Bell decided to implement Unix on 370-class machines rather than on a more conventional choice — a Digital Equipment Corp. PDP-11, for example — is relatively straightforward. First, some applications require processors that can accommodate up to 200 concurrent programmers, far beyond the support capabilities of most minis, Buroff said.

Secondly, large-scale IBM CPUs often provide better reliability, boast greater processing power and support larger share data bases than the PDP-11 series, Buroff said.



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User Weighs Pursuit of Suit Against Wang

(Continued from Page 1)
on Nantucket Island."

Difficulties with Brock's computer began shortly after the machine was installed in April 1978, according to John D. Brock, a shareholder in the \$2 million company.

Within weeks after the system was plugged in, its 10M-byte disk drive started generating error codes, indicating that there was some sort of read or disk format error, Brock said. Wang technicians were dispatched to the island on several occasions to re-

align the malfunctioning disk; they eventually blamed the problems on Nantucket's power supply, Brock said.

The Brock Co. verified Wang's reasons for the disk's problems by renting a line analyzer, which detected a variety of fluctuations in the island's power supply. To compensate for the line problems, the user then purchased a custom-made uninterruptible power supply (UPS) at a cost of about \$5,200.

However, the disk errors continued even after the UPS was installed, Brock said.

New Drive, Same Problems

Wang subsequently delivered and installed a new disk drive. That drive also developed problems similar to the ones experienced with the first unit, according to Brock.

Shortly after the new disk was installed, Brock received a \$585 bill from Wang for services rendered under the vendor's Plan B maintenance contract. However, the insurance agency refused to pay, claiming that the system's problems were not its but Wang's responsibility.

Wang reportedly countered the user's refusal to pay the bill by denying further maintenance service. The insurance agency subsequently filed suit to recover damages caused by the computer system's problems, Brock explained.

The suit originally asked for \$80,000 in damages, but has recently been amended to \$200,000, according to Gerald Abrams, the plaintiff's lawyer.

Major Focus

The suit filed by the Brock Co. focuses on Wang's contention that the computer's problems resulted from Nantucket's fluctuating power supply. Although the insurance firm has the only Wang processor on the island, there are at least 10 other computers on Nantucket that are operating under the island's power system without any apparent problems, Abrams said.

Another major focus of the suit is Brock Co.'s contention that while Wang was unable to isolate the computer's problem — which it claimed originated in the system's disk drive — the problem was found and quickly corrected by a third-party service firm. The service firm — Northeast Digital Service, located in Pennsylvania — contacted Brock in response to an advertisement which appeared in the Nov. 25 Northeast edition of *The Wall Street Journal*.

Dan Collins, owner of Northeast Digital Services and a technician, said he isolated the system's problems "almost immediately" and traced its difficulties to the firmware revision levels of the disk processor. "The revision level has something to do with the way the CRC [cyclic redundancy check] generator works," he explained. "It's just an error-checking routine that the processor goes through."

Apparently Wang had inserted a "new revision board with old revision firmware" into the processor, he continued.

Collins maintains that the problem was not related to Nantucket's power supply or faulty programmable read-

Other Users Report Problems

NANTUCKET, Mass. — If the response generated by an advertisement in a national newspaper is any indication, the Albert G. Brock Co. here is not the only user having problems with computer equipment from Wang Laboratories, Inc.

The small insurance firm placed a one-day ad in the Northeast edition of *The Wall Street Journal* in late November asking for information from Wang users who might be having problems with their computer gear. About 75 users throughout the Northeast replied to the ad.

The ad explained that the Brock Co. was experiencing "severe problems" in the operation of its system and requested information from similarly troubled users in the hopes to "solve a problem that could be common to all of us." Nearly 80% of the replies to the ad came from users experiencing some sort of difficulty with their Wang system, according to John D. Brock, a shareholder in the insurance firm.

The advertisement was similar to one placed in *The Journal* in 1980 by Quality Books, Inc., a Northbrook, Ill., firm that had problems with Burroughs Corp. computer equipment and is presently involved in a lawsuit with that firm [CW, Sept. 8]. The Quality Books ad — which was placed before the company filed suit — garnered more than 100 replies from unhappy Burroughs computer users, and was apparently responsible for generating a number of lawsuits by users who discovered their problems were not isolated.

In a prepared statement, Wang referred to the ad "as an attempt by Brock to influence the outcome of [the] litigation."

The attorney for the Brock Co., Gerald Abrams, last week said the letters sent in reply to the ad will not be initially presented to the court, but could eventually be incorporated in the case if nothing is done to resolve Brock's problems.

only memories. "It was the firmware," he stated.

When questioned about Wang's two-year search for a relatively minor problem, Collins observed that it might have been a case of "inexperienced personnel looking at the machine. I would imagine they just overlooked it."

At press time Wang had not been notified of the nature of the problem or told that the 2200T is now operating properly. The Brock Co. is waiting for a written report being prepared by Solotest Corp., a testing agency located in Framingham, Mass.

When contacted last week, Abrams was drafting a letter to Wang to inform its lawyers that the computer problems had been isolated and could be duplicated. The letter will be sent sometime this week pending the completion of Solotest's written report, according to Abrams, who plans to give Wang two weeks to reply to the letter.

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Xerox Alters Ethernet to Fit IEEE 802 Standard

(Continued from Page 1)

tions on Ethernet were jointly issued by Xerox, Intel Corp. and Digital Equipment Corp, the three companies that together developed Ethernet.

Because of that imprecision, it is possible to design a transceiver that meets the Blue Book specification

Quick — Say 'Rabbit' Thrice

(Continued from Page 1)

laughed so hard in a long time," the letter said. "Do you have any more of those?"

Actually, Callow has about 56,000 items of superstition and folklore, 40,000 of which are still on cards that must be input into the computerized data base. His list of superstitions is continuing to grow, thanks to contributions from his students in his Folklore Archiving course and from the general public that reads about the collection and wants to add something from a grandparent or relative.

Each item includes the name, ethnic origin, age and address of the informant. In the computerized system, when an item — for example, on superstitions related to black cats — is retrieved, the informant profile for the first contributed item by each person also will be displayed. Retrieval is via key words in the text.

Computerizing Collection

Callow said the sheer volume of the collection forced him to computerize it. Each of the students was turning in about 150 items, complete with informant profiles, and it became impossible to cross-index these for easy retrieval.

The manual system was "messy," Callow said, so he incorporated the entering of data and programming of retrieval programs into his coursework, offering extra credit to students who provided assistance. Currently, students are working sometimes for 10 hours at a stretch, standing at IBM key-to-disk equipment to enter the 40,000 items that remain on cards.

The computerization itself was completed and maintained by Steve Miranda, a programmer with Ford Motor Co. who formerly worked in the university's computer center as an undergraduate and graduate student. Miranda was involved in the preparation of between 15 and 20 programs written in Algol, Cobol and PL/I that served to set up the data base, check the input data for errors and arrange for retrieval and CRT displays.

Access to the data base is available on either an interactive basis, via a prompt program the user can employ on a CRT terminal, or through written requests for printouts via batch processing, he explained. Because of the size of the data base, it is maintained on magnetic tape rather than disk.

Callow still welcomes additional material, which can be sent to him at the Computerized Folklore Archive, Briggs Building, University of Detroit, Detroit, Mich. 48221.

and yet is not properly grounded, he said, adding that all the transceivers made by Xerox are properly grounded as are "all the commercial ones we've seen."

Hewlett-Packard Co. made a transceiver in its laboratories that met the Blue Book specification and yet was not properly grounded. As a result, Liddle said, HP proposed to the 802 committee a different way of writing the grounding specification that makes it more definitive "and therefore you can't make this mistake."

"We agree with that and we're going to incorporate that change in the Blue Book specification. There is an example of a place where, as we have said, if it was a constructive change that actually improved the spec,

we'll adopt it and that's what we've done."

The problem with the 802 committee is that it has yet to finalize standards and there is no definite date for that, the vice-president commented. At the same time, many small companies have told Xerox they intend to build Ethernet-compatible components.

Concern for 'Little Guys'

"I am not gonna jerk those little companies around just because some guys in Data General or Hewlett-Packard or the telephone company or IBM who sit in a committee want to vote over which bits ought to be where in a way that's different than we've been doing," he declared.

The success of a standard ultimately depends on how many and which vendors choose to support it, he said.

Asked what he thought about the continuing controversy over Ethernet, Liddle replied, "This will probably sound funny to you because of all the noise surrounding this, but the Ethernet is a context. You know what I mean? The Ethernet is not what Xerox wants to sell."

He went on to say Ethernet was intended to be an open network for connecting Xerox' and other vendors' office products. He does not care about cable, modulation techniques and baseband or broadband, Liddle claimed, referring to them as "the lowest form of pick-and-shovel engineering."

(Advertisement)

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Of course, the IBM manuals are designed to tell you all there is to know about OS JCL. But that's what makes it so frustrating when you have to code the JCL for a new application. When you look up a function in the manuals, there are often pages of detail that don't apply to your situation...or do they? It's hard to be sure from the few examples shown. So you end up figuring things out on your own, through trial and error, or by consulting the JCL "guru" in your shop. Either way, you avoid coding new applications in JCL whenever possible...they're just too much trouble.

Unfortunately, most "training" courses and texts on OS JCL are no better than the manuals they're supposed to explain. They get so wound up in complex details, without ever showing real-life examples, that you don't learn much. Then, when you want to know how to code a specific function, it's back to the manuals and the trial-and-error process.

Now, though, I'm happy to tell you about a textbook that concentrates on the practical use of OS JCL. It doesn't try to teach you everything there is to know about the subject. But it *does* teach you how to code the JCL for applications that occur every day in an OS shop.

For example, you'll learn to execute utility, sort/merge, language translator, and link-edit programs. You'll learn to create, maintain, and execute JCL procedures. You'll learn to code JCL for handling sequential, direct, ISAM, and VSAM files. You'll learn what JCL to use on virtual storage systems. What's more, you'll learn to use time-saving techniques that can reduce coding errors. And you'll be introduced to a standard method of "structuring" your JCL code so it's easier to read and modify.

2 reasons why this book is effective

1) Probably the most important feature of this book is that it contains hundreds of illustrations. You won't just read about the JCL to use for a certain application; you'll see an actual JCL listing that you can use as a model for your own code.

For example, there are listings that show how to: use the IEBUPDTE utility to create and modify OS libraries; execute compiler procedures for COBOL,

PL/I, FORTRAN, and assembler language programs; create the required data areas for VSAM files; link various combinations of source and object modules; and much, much more. In our experience, examples like these, more than any other factor, determine whether or not a course is effective. And they are the missing ingredient in most JCL courses—and in the IBM manuals.

2) The educational approach used in this book is one we've found to be effective again and again. Quite simply, a complete subset of JCL is presented in the first three chapters. That means you can start coding the JCL for many applications right away. After this, all material is organized by function (using procedures, executing utilities, and so on). So after you've finished the first three chapters, you can go on to any topic you want to know about.

Who this book is for

Simply stated, this book is for people who need to write OS JCL. This includes beginning programmers who have had a programming course (or are taking a concurrent course in a programming language); the experienced programmer who is new to the OS environment; and the experienced programmer, systems analyst, data control specialist, or computer operator who may be familiar with some parts of OS JCL through experience, but who has never mastered it. So if you use a System/360-370 running under some version of OS (MFT, MVT, VS1, VS2, or MVS), this book is for you.

How to use this book

If you're reading this book on your own, you can decide for yourself what to

study and when you want to study it. For example, suppose you need to know how to compile a COBOL program. After you've mastered the basic subset (chapters 1-3), you can skip over the chapter on advanced file handling and go straight to the chapter on compiling programs. In other words, the book's modular organization lets you study the parts you want to study in your own time.

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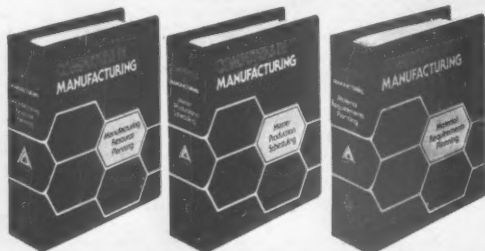
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Carnegie-Mellon CPU Programmed to Duplicate Early Scientists' Thinking

PITTSBURGH, Pa. — Learning by tracing the steps of the masters is a time-honored practice and researchers at Carnegie-Mellon University (CMU) here are using the same techniques to teach a computer to repositulate theorems set down by early scientists.

The program, called Bacon, is the brainchild of Patrick Langley, who created the program as part of a doctoral thesis. Running on a Digital Equipment Corp. Decsystem-10, the program has been able to rediscover a series of principles set down by such noted scientists as Johannes Kepler and George Simon Ohm.

The program is fed the same raw data that early scientists had at their disposal. From that information, the program has been able to draw fundamental conclusions that accurately resemble the original theories.

The advantage is that in several minutes, the DEC processor can reach conclusions that took months for early scientists to reach, according to Dr. Herbert Simon, a Nobel prize-winning computer scientist at CMU.

Another program developed at CMU is one that studies a physics problem and draws a picture representing the problem. The program then uses the picture to find an answer.

One such problem, Simon said, in-

volves a man standing at a given position on a ladder supported by a rope. The program used a graphics representation to find out how much stress is being placed on a given point on the ladder.

Simon, among others, has been studying the way man thinks and comparing it to the way a computer can be taught to evaluate data. At this point, he concluded, computers solve problems in much the same way man does.

Abstract Thought

However, the CMU researcher noted that computers lack the capability for abstract thought.

About 25 years ago, when Simon began his research on artificial intelligence, he operated on the basic premise that if computers could be taught some fundamental learning techniques, they would be able to think in a way similar to humans.

For the most part, he said, that theory has turned out to be true. However, there have been some surprises. It was originally thought it would be easier to teach a computer to perform manual labor than to program it to solve intellectual problems. The opposite has proved to be the case. It is easier for processors to solve a complex, conceptual mathematical problem than, for example, to run a bulldozer, Simon said.

Language was another surprise. Scientists originally thought translations involved a straight-forward process — a one-to-one correlation of words. However, researchers found humans translate from one language to another by a more complex method.

There is an intermediate step where words are given meanings and the idea is translated. Simon linked that example with the ladder problem. The program used an intermediate step of graphically representing the problem to develop an answer.

Currently, Patrick Langley's program has only been used to evaluate data for which a physical principle is already known. Simon, however, contended the program could be utilized as an aid to scientists engaged in research.

While the idea of a "scientist's helper" may not be impossible, Simon indicated that the CMU research is offering a more short-term benefit in terms of improving teaching techniques.

Simon noted that current teaching techniques involve bombarding students with words in the hope that some of the words will be absorbed and transmuted into knowledge. He contended that this process is not good enough. Artificial intelligence studies may offer some clues to bettering the education process, he explained. The CMU research may also be used as an aid in solving even more complex issues like those involved with a nation's economy. However, Simon pointed out that a computer must be programmed with human values in order to achieve this goal.

DEC Reduces Product Prices

MAYNARD, Mass. — Digital Equipment Corp. has announced price cuts for a number of its products and services. The reductions became effective last week.

DEC's low-end disk products, the RL01 and the RL02, each will sell for \$3,000, a reduction of 41% and 46%, respectively. When more than two RK07, RM80 or RM05 disk packs are added to a computer system the price of the second disk is reduced by as much as 53%.

All prices for add-on memory for its microcomputers were reduced 28% to 34%. For example, 256K bytes of MOS memory now costs \$1,900, a 34% reduction; 512K bytes of memory is priced at \$3,300, a reduction of 33%, the vendor said.

In addition to the hardware price reductions, DEC's Customer Services Organization announced a six-month program whereby customers who purchase a PDP-8, PDP-11 or VAX-11 computer and opt for a one-year Decservice contract will receive an additional month of warranty service at no extra charge. All add-on devices ordered with a service contract will have free installation, the vendor said.

Software service discounts of up to 15% also are being offered by DEC for multiple system contract services. Software product updates purchased with a software license and service contract will be discounted up to 50%.

Local-Net Architectures

Sytek Exec Claims IEEE 802 Unlike Ethernet

By Brad Schultz

CW New York Bureau

SUNNYVALE, Calif. — An emerging standard for local networking will be quite different from Ethernet, according to Robert R. Shatzer, director of Product Line Support for Sytek, Inc. here.

Xerox Corp., Digital Equipment Corp. and Intel Corp. jointly developed the Ethernet local-network architecture, and Xerox already markets products based on it. Sytek offers Localnet, a broadband network competitor to Xerox's baseband Ethernet.

Shatzer is also chairman of the Higher Level Interface Subcommittee of the Institute of Electrical and Electronics Engineers (IEEE) Local Area Network Standards Committee, which is drafting IEEE Standard 802 — the standard that many felt would be closely Ethernet-compatible. Standard 802 stipulates local network speeds of 1M-, 5M-, 10M- and 20M bit/sec, Shatzer pointed out. Ethernet permits only 10M bit/sec traffic.

HDLC Compatibility

At a recent press gathering in New York, Xerox Vice-President David E. Liddle explained that Ethernet can run with the International Standards Organization's High-Level Data Link Control (HDLC) protocol or IBM's Synchronous Data Link Control (SDLC) protocol [CW, Dec. 21]. But HDLC and SDLC are (by popular models of network architectures) second layer protocols, which Ethernet can only replace, not supplement, Shatzer said.

Ethernet only covers the bottom two layers of a network architecture — functions at the workstation, rather than along data links. According to Shatzer, Ethernet's incompatibility with HDLC precludes compatibility with X.25, the emerging international standard for links between workstations and public data networks that entails implementation of HDLC at the second layer and X.21, another protocol, at the first layer.

A third layer protocol, X.25, appears likely to turn up in AT&T's Advanced Communications Service, according to informed sources. The X.25 protocol is already a standard in most of the world's public data networks — such as Tymnet and Telenet in the U.S. — and is now available with IBM hardware; so the issue of whether Ethernet runs easily with X.25 is important to users, Shatzer

Institute to Sponsor Banking Seminar

PARIS — The Institut de Recherche Interbancaire will sponsor its 11th International Banking Seminar at the Meridien Hotel here April 21 through April 23.

Topics that will be covered during the conference include: generalization of real time, decentralization of computers, office automation, the emergence of microcomputers and developments in telecommunications.

Further information is available from the Institut at 40 Rue de Montcaeu, 75008 Paris, France.

pointed out.

Meanwhile, IEEE 802 has been drafted to feature HDLC's framing structure, he stated. This means products compliant with IEEE 802 will define the borders between datagrams (pieces of text or data sent by the user) in a manner different from Ethernet's approach.

Incompatible framing structures could lead an Ethernet machine to misread transmissions from an HDLC, SDLC or IEEE 802-compliant machine, Shatzer indicated. IBM's SDLC protocol is considered a subset of HDLC.

Another difference between IEEE 802 and Ethernet concerns the meth-

od for determining precisely when a workstation in a local network may access resources of the network's central processor, Shatzer noted.

Accessing Methods

Ethernet features a method called carrier sense multiple-access with collision detection (CSMA/CD). An alternative, favored in the UK, is called token passing. The IEEE Local Area Network Standards Committee has decided that both CSMA/CD and token passing are acceptable for IEEE 802, Shatzer pointed out.

"I have been involved in 802 since its inception," Shatzer recently wrote in a Sytek memo. "The com-

mittee has just finished their first ballot cycle on the draft standard. The standard only remotely resembles Ethernet in the area that deals with Ethernet-style architectures," he continued.

The Local Area Network Standards Committee's deliberations have been especially creative, he later explained to *Computerworld*, in the area that deals with architectures much different from Ethernet — specifically, the passing of tokens through "busses or rings."

The IEEE standard 802 may be finalized this year, Shatzer confirmed. Ethernet-based products are already commercially available.

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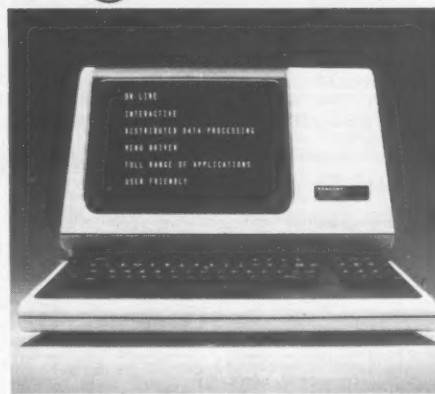
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Explores Impact on Managers

Yourdon Details Software Development Trends

By Lois Paul
CW Staff

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automated software development, knowledge-based systems, personal computers, the software cottage industry and color graphics.

These are the predictions of Ed Yourdon, president of Yourdon, Inc., who presented a one-day seminar here entitled "Future Trends in Software Development" last week.

"Productivity and quality is the underlying theme of all the topics," he said. He noted that in the U.S., and in Europe to some extent, DP programmers produce three to five errors per 100 lines of code. In Japan, however, software is being offered with 25-year warranties.

"Many DP organizations here are recognizing the need to improve," Yourdon said. A key to this is the use of structured techniques. This involves defining the users' needs before beginning a software development project through the use of top-down partitioned graphics models of the user requirements, modeling and iteration.

The model consists of data flow diagrams, structure charts and pseudocode and was designed to give a good idea of the properties of the system for a smaller amount of money. The iteration concept provides for the refinement and modification of the model until it reaches a satisfactory form.

Among the problems facing DP managers who choose structured techniques are conflicts with project management methodologies and auditing standards, Yourdon said, and "typically, the project management group wins."

Yourdon predicted that in the next few years, structured analysis and design will become standard offerings in universities, competitive offerings will converge into two to three different approaches, information modeling and structured analysis/design will be merged together and automated tools will be developed to support structured techniques.

He advised DP managers to urge their organizations to employ structured techniques, as well as to look for structured expertise in new hires. Another recommendation is the emphasis of walk-throughs and the use of outside audits to ensure that the techniques are being practiced correctly. "Measure your results — you can't manage what you can't mea-

Limited Corporate Commitment Extended to Structured Techniques

By Lois Paul
CW Staff

NEW YORK — There is widespread awareness of structured techniques in industry, but corporate-level commitment is still fairly limited, according to Ed Yourdon, president of Yourdon, Inc., at a recent seminar here.

He said that although a large number of companies consult with his firm for information on structured techniques, and even go so far as purchasing textbook materials or attending seminars, very few opt for intensive, in-house training in the techniques.

The DP consulting group conducted a general survey in 1979-1981 in which 32 companies that were not necessarily Yourdon clients provided extensive details of their development effort.

Of these, 13% did not finish their project, 12% used no structured techniques on their project, 88% used walkthroughs (peer group reviews), 88% used structured coding, 76% used structured design and 47% used structured analysis, according to the survey. Only 9% of the project time was allocated for analysis, Yourdon reported.

The balance of the time was spent on design (29%), coding (19%), testing (28%) and "other" (15%).

For all projects in the survey, the best performers were 550% better than the worst in terms of net lines of code delivered to the users. The best performers also were 300% better than average. For the first six months of operation, the average defect rate was .73 bugs per 1,000 lines of code, which is considerably better than the national average, according to Yourdon. Projects using structured coding reported .51 bugs per 1,000 lines of code. Projects that did not use structured coding reported 1.34 bugs per 1,000 lines of code.

In terms of maintenance during the first six months of operation, the survey reported that the average project required 39 work hours per 1,000 lines of code. Projects using structured design reported an average of 27.1 work hours per 1,000 lines of code. Projects that did not use structured design reported 72.7 work hours per 1,000 lines of code.

Further information is available from the firm at 1133 Ave. of the Americas, New York, N.Y. 10036.

sure."

The growing programmer shortage has emphasized the need for automated software development tools, Yourdon said. What is needed are opportunities for reusable code and for mechanical code generation, as well as for support mechanisms for the graphics work associated with structured development and design.

Yourdon pointed to Bell Laboratories' Unix OS, the programmer's workbench concept and various automated design tools as future trends that answer some of these needs.

An advantage of Unix, according to Yourdon, is its 100 system utilities that make no assumption about the source or destination of their input and which can be linked together for a wide variety of applications. The programmer's workbench concept

basically involves giving the programmer and analyst an individual workstation for program development. The advantages, according to Yourdon, are consistent fast response and the provision at the local terminal level for screen rather than line editors.

A disadvantage might be allowing programmers too much "compute power," but the establishment of management controls can offset this problem.

The advice for DP managers from Yourdon, Inc. is to take advantage of the Unix expertise available in new university graduates, buy a small Unix machine and experiment with it, try the programmer's workbench concept using personal computers and look for automated design packages that integrate graphics capability with data dictionary management.

In the areas of knowledge-based systems, personal computers, the software cottage industry and computer graphics, the major word from Yourdon was to keep abreast of developments, develop some in-house expertise and attempt to take best advantage of the new technologies and facilities.

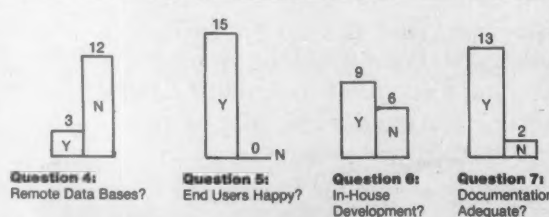
With regard to knowledge-based systems, expertise could be obtained either through in-house attempts at small-scale projects or through hiring or contracting with someone who is literate in this field.

DP managers could take advantage of the software cottage industry trend by setting up programmer's workbench facilities to provide for at-home software development, Yourdon said.

Correction

In the User Spotlight on data base management systems that appeared on Page 12 last week, the figures in

the second chart were incorrect. The following chart contains the correct figures:



Ex-Employee's Suit Against Univac Dismissed

By Bob Johnson

CW New York Bureau

ALBANY, N.Y. — A \$20-million lawsuit brought against Sperry Univac by a former employee who charged that the company forced him to rig bids for a New York State DP contract was dismissed here recently.

The suit, filed by Robert Gazit of Clifton Park, N.Y.,

was dismissed last month as a result of appeal hearings in the Second Circuit Court of the U.S. Court of Appeals, according to a Univac spokesman. The court reportedly felt that Gazit did not have a substantial claim against Univac.

Gazit had appealed the case in December, after the trial ended when Univac won a motion for judgment.

The original complaint,

filed last March, charged Univac with compelling Gazit, a DP consultant with the company, to perform "illegal and unethical services" in order to get a Department of Social Services DP contract [CW, March 23]. The contract would supposedly have been worth \$2.5 million a year to Univac.

Gazit alleged that Univac wanted him to participate in a scheme and conspiracy to

rig a request for proposal for approximately 4,000 communications terminals for the New York Department of Social Services. He said Univac wanted him to use his skills to tailor bid specifications for the terminals "only for Sperry Univac products."

Gazit also claimed that Univac falsely represented his job description prior to his employment and misrepresented facts about minicom-

puters purchased for him to install.

Univac said that it has filed counterclaims against Gazit, charging that the former employee libeled the company and "tortiously interfered in contracts between Sperry Univac and the State of New York."

Gazit and his counsel could not be reached for comment on the appeals court decision.

System Lets Constituents Talk to Rep

WASHINGTON, D.C. — Philadelphia residents can correspond with their congressman, Rep. Jim Coyne (R-Pa.), by computer now that an experimental electronic mail system has been set up.

Area constituents who have access to any type of computer terminal are able to dial up the representative's electronic mailbox directly through a system provided by Dialcom, Inc.

Calling it the "first of its kind," Coyne said that the communications system will allow his constituents to send messages or complaints to him in a matter of seconds and at a cost lower than that of the mail. Replies can be sent the same way, he added.

The system operates by utilizing Dialcom's software and its Prime Computer, Inc. 750 CPU, in cooperation with the House Information System (HIS) electronic mailboxes. When messages are input at a sender's terminal they are sent via telephone lines asynchronously to Dialcom's computer and are then forwarded to Coyne's terminal in Washington, D.C.

Coyne said that some big advantages of the system are that it combines the best features of the telephone and the mail and that messages entered day or night can be stored in the CPU. In addition, the message can be sent to all 435 House members through HIS for the same amount.

"In the evenings and on weekends when telephone rates are lower, a person can send a message by computer in only seconds for the same 20 cents that it now costs for first-class mail," he said.

Coyne estimated that "several thousand" of his constituents have access to computer terminals. He also cited the growth of the personal computer market, expected to have nearly 2.5 million users in America within two years, and said that he hopes to see other members of Congress follow his lead.

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Local Net at Brown University Survives Fire

By Brad Schultz

CW New York Bureau

PROVIDENCE, R.I. — A phone company torch left burning unattended during a lunch break set fire to 2,100 twisted pairs of local-network cable here at Brown University recently, but broadband data traffic resumed just 45 minutes after the blaze ended, a campus official said last week.

The quick restoration of service demonstrated the flexibility of broadband communications as a local net medium, Bill Ship, assistant provost maintained.

This flexibility, he added, was a primary reason why Brown University chose broadband for its local net, rather than baseband — an approach exemplified by Ethernet — or continued dependence on phone company resources.

Administrators, researchers and students at Brown temporarily lost links to four campus computer systems when polyvinyl chloride insulation on twisted pairs of broadband coaxial cabling was consumed by a MAPP torch, reportedly left burning in a manhole while New England Telephone Co. workers lunched. Until stopped by firemen, flames traveled along the cabling — up conduits and into buildings — for about an hour, Ship said.

Transition Time

A private liberal arts university, Brown has an IBM 4341, a 4341-II and a Digital Equipment Corp. PDP-11/70 for administrative applications. Its computer science

department operates a DEC VAX 11/780, Ship noted.

"The fire could not have occurred at a worse time for Brown," he remarked. During the final weeks of a semester, students were scrambling to finish computer-based final projects for courses.

Moreover, the university was completing transition from dependence on the phone company for local-

network resources to dependence on a 300-port broadband communications system, the Localnet 20 from Sytek, Inc., he said.

Quick Restoration

The New England Telephone workers were still digesting their lunches on the day of the fire when new coaxial cable was reeled out and the Localnet 20 resumed service, Ship recalled. But

voice traffic, also carried by the twisted pairs, was not fully restored until 24 hours after the blaze ended. A day later, university computers ran at 70% of normal volumes, Ship stated. A few problems with misconnections persisted as of last week.

Nevertheless, the incident proved that broadband communications, in which data is propagated at radio frequen-

cies along miles of coaxial cable, can adapt promptly to sudden destruction of links, the assistant provost asserted.

Brown's broadband local net features a gateway to the developing Computer Science Research Network, the packet-switched network of GTE Telenet Communications Corp. and Cognet, a research network for cognitive scientists, he pointed out.

Candle Corporation offers a report on:

IBM LARGE SYSTEM ANNOUNCEMENTS OCTOBER, 1981

In 1980, Candle Corporation[®], the developer of OMEGAMON[®], wrote an MVS-SP and SE2 report that was requested by more than 1,000 companies.

Now, Candle has written an extensive report analyzing MVS/XA and other large system announcements made by IBM on October 21, 1981. This report is directed toward both management and technical personnel.

Some questions addressed in this document are:

- What are the implications of the pricing structure of the extended architecture software?
- Is large system distributed processing here (MVS/OCCF)?
- What is the future of MVS, VM, and DOS?
- What will happen to the 3033 series? The 4300 series?
- How does the 3880-11 Paging Subsystem compare to existing paging subsystems?
- What will be the performance benefits of the 3081 Dynamic Channel Subsystem?
- Will MVS/XA be easier to install, tune, and maintain?
- What will be the future of TCAM, VTAM, and BTAM?
- What will happen to IMS and CICS?
- What will be the impact of MVS/XA on your existing workload and on your currently installed software?

CUE Plans Conference

KANSAS CITY, Mo. — The Comten Users' Exchange (CUE) will hold its 18th international conference April 26-30 at the Hilton Plaza Inn here. The conference will focus on "Emerging Network Technologies."

Guest speakers will include representatives from AT&T who will discuss the firm's fully separate subsidiary and speakers from International Telephone and Telegraph who will focus on data communications in Europe.

Other sessions will cover emulation processing and network control.

More information is available from W.R. Whitten, CUE President, c/o Owens-Corning Fiberglas, Fiberglas Tower, Toledo, Ohio 43659 or Jerome R. Polacek, CUE Liaison, NCR Comten, Inc. 2700 Snelling Ave. N., St. Paul, Minn. 55113.

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IBM Large System Announcements—October, 1981

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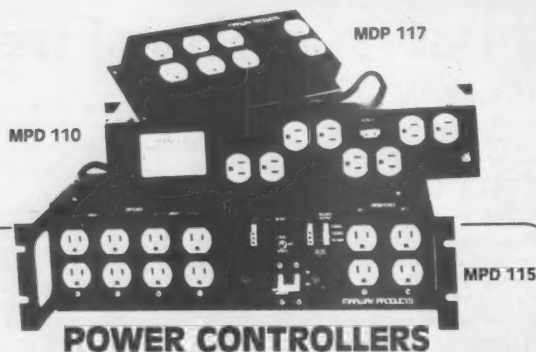
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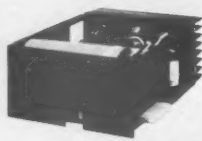
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Decision Expected Soon On Fledgling Ecom's Future

WASHINGTON, D.C. — The U.S. Circuit Court of Appeals is likely to decide "within the next few weeks" whether to let the U.S. Postal Service continue offering its Electronic Computer-Originated Mail (Ecom), the controversial on-line message service for bulk mailers that began operation at the beginning of this month.

The Department of Justice, backed by several commercial vendors of electronic message services, wants Ecom halted because it allegedly has not been approved by the Postal Rate Commission, as required by law. The Postal Service, however, maintained that Ecom was approved by the rate commission. What actually occurred was that the commission approved an experimental Ecom service and the appeals court subsequently said the agency lacked the power to set a time limit. The matter was then remanded back to the Postal Rate Commission for further consideration.

The Postal Service "persists in describing the [Postal Rate] Commission's recommended decision as an

approval of a permanent Ecom coupled with a 'discrete' experimental condition, and on this description, it builds the bulk of its legal argument," the Justice Department told the court last week during the latest round of the proceeding. "The service's description, however, is new-speak, for the record is unequivocal that the commission recommended only an experimental Ecom."

Whether Ecom was authorized as an experimental service or as a permanent service with a "discrete experimental condition" may appear to be a distinction without a difference. However, the latter interpretation indicates that Ecom has been properly authorized while the former indicates it has not, explained one attorney familiar with the case.

The court's options, he added, are to halt Ecom subject to reauthorization by the Postal Rate Commission or to let the present service continue on a permanent basis. If the Postal Service is forced to go back to the commission, it has the power to let Ecom continue short-term up to 150 days.

Opposition Vigorously Attacks Bell's Latest Rate Hike Proposal

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — AT&T's latest rate increase proposal — 1.57% for long-distance toll service, 4.1% for Wide Area Telecommunications Service and 1.6% for private line service — was vigorously attacked last month by data communications users and Bell competitors in filings submitted to the Federal Communications Commission (FCC).

Bell's competitors are unhappy partly because the tariff, which AT&T wants to become effective March 3, would reduce rates for certain message services. For example, operator-assisted dial-up calls made during evening hours would cost less.

AT&T also proposed use of a new "calling card" — a replacement for the company's present credit card — which for the first time would reportedly put rates for credit card calls below those for collect calls.

The existing off-peak discount for evening calls is "already too great," according to MCI Telecommunications Corp., a specialized carrier that offers a competing long-distance message service called Execunet. MCI also said the new rate for calling card service had not been cost-justified.

Proposed Rate Increase

The proposed rate increase is needed largely because of losses, which AT&T is sustaining on the local exchange facilities it leases to the specialized carriers, according to an AT&T spokesman.

However, the International Communications Association (ICA), composed of corporate telecommunications users, told the FCC that these Exchange Network Facilities for Inter-Exchange Access (Enfia) rates are

the result of a contract that the phone company signed and must now live up to.

"If AT&T believes the bargain was 'improvident,'" ICA added, this is not sufficient justification for "wholesale cross-subsidization" of Enfia rates with revenues collected from end users of the Bell network.

Meanwhile, in a related attempt to recoup its losses, AT&T proposed a new Enfia rate schedule to become effective April 16, the day after the present agreement expires.

The new rates are substantially higher than the current ones and, if adopted, would increase charges to end users accordingly. The amount of the increase is indicated by comparing the proposed rate for a local-access line — \$327/mo — with the present rate, approximately \$130/mo.

Paying Higher Rates

If the Justice Department's antitrust suit against AT&T is settled along the lines of the agreement recently signed by government and telephone company attorneys, AT&T's Long Lines Division, as well as the specialized carriers, will have to pay the higher rates. But under the settlement agreement, that will not happen for at least 18 months, during which time only the specialized carriers will be affected.

MCI Vice-President Philip Nyborg referred to this situation shortly after AT&T filed its new Enfia tariff, when he said the phone company is now in a position to "disadvantage its long-distance competitors."

A spokesman for Southern Pacific Communications Co. added that the proposed rates "are anticompetitive in both intent and effect. They should be something like \$30 rather than more than \$300."

Educational System Blamed Critical Programmer Shortage Predicted by '90

By Bob Johnson

CW New York Bureau

NEW YORK — "By 1990 there will be only three-tenths of a programmer available for every machine delivered in this country."

That was the prediction of James E. Homet, director of management information systems (MIS) strategy for the Coopers & Lybrand accounting firm, when he spoke before the New York Financial Writers' Association here.

Homet, formerly director of training for IBM, said that the severe shortage of DP personnel and computer scientists in the U.S. may affect economic growth in the near future. The country can benefit from its technological advances in the computer industry only if the technicians required to use the machines and services are available. "There is a shortage of DP people because of the technical complexity of the industry. It's just soaking qualified people up," he said.

Systems analyst and programmer positions will be the most critical areas for the '80s, he said. And the computer industry can expect a 15% to 40% shortage of these types of skills, according to Homet.

Most of the blame for this projected shortage rests with the educational systems, he maintained. "Unfortun-

nately, universities cannot meet the salary requirements of qualified instructors who can earn more on the outside," he said. He added that this lack of money also holds true for the computer hardware needed at colleges. The combination of these problems results in a lack of new DPers, Homet said.

Along with the shortage of programmers and technicians, Homet cited the lack of progress in the methodology for producing computer programs as a major problem to be faced in this decade. He noted that one instruction for a program cost about \$4 in 1953 and that the estimate for 1981 was about \$8 per in-

struction. "A system with 20,000 lines of code costs in the neighborhood of \$160,000," he said.

He added that software such as IBM's MVS operating system, which may include from 2½ million to three million lines of code, is extremely expensive to produce. This combination of high development costs and the lack of technical people with the skills to implement such systems could drive software costs up substantially, Homet noted. This rise in cost could eventually affect the U.S. position in the international computer market, he said.

Stressing that it is critical for the U.S. to maintain a strong presence in

the software field, Homet predicted that France and Japan are going to be serious threats in the international software market.

France is currently the number two presence in the market and will eventually dominate the software side of the industry in the '80s, according to Homet. "Software services have been growing 25% a year since 1975. I feel that software may outproduce hardware," he said.

Noting that software does not suffer from the "stigma of national origin," Homet warned that this country does not have the last word on its production.

Society Publishes Conference Results

CHICAGO — The Society for Management Information Systems (Smis) has published the proceedings from its Second Annual Conference on Information Systems, which was held last December in Cambridge, Mass.

Copies are priced at \$25.

Smis is headquartered at Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.

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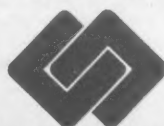
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How to Sell Management on Hiring Consultants?

Turnaround Time By Larry E. Long

Q I was informed last week that I will be promoted from assistant director to director of a large computer center (more than 200). We are a solid operation, but not without problems.

All of our managers have been promoted from within, so we are very inbred. In the 26 years that I have been with the company, we have never hired an outside consultant.

Each time I mention that we might be able to benefit from the insight of someone outside the company, I'm ignored by top management. The attitude both at the top and with the people in our department is that we know our company better than anybody else and can do it better ourselves.

In the short term I would like to solicit outside assistance in structured methodologies, planning, documentation and career development. How can I reverse top management's attitude about consultants?

Wait until you are firmly seated in the top slot and have made a couple of major decisions. Then suggest the possibility of using consultants to "enhance responsiveness to the user community."

Since consultants will be a new experience for your company, suggest a pilot project with a high probability of success and retain a proven winner to help you address this need. If you select the right project, it should be relatively easy to compile a benefit/cost analysis with very convincing numbers.

Q Three years ago I compiled a manual for system development. It also contains documentation standards. Since that time it has been used only sporadically, if at all.

I am not in a position to demand or even request that programmers and analysts follow these standards. How do I get people to use the manual?

A Without any specifics, I would assume that your manual problem parallels those in similar circumstances: lack of management support, training, well-defined responsibilities and manual quality.

Standards manuals must be sold from the top down. It is a waste of time and money to distribute a system development manual without management support. Your task now is to persuade information services management that their support of this manual is essential.

Conduct periodic training sessions on the objectives of the methodology, how to use the manual and procedures for quality control. The mere distribution of a standards manual is no guarantee that people will use it.

A standards manual must be accompanied by procedures that define specific responsibilities. For example, the project leader might be assigned the responsibility for the accurate completion of all new development and maintenance documentation.

Has it ever crossed your mind that the document you compiled is of questionable quality? Ask an unbiased and knowledgeable person for an opinion of the quality of your manual. A less-than-glowing evaluation should be followed up with revisions or perhaps a rewrite.

Q I'm a Cobol programmer with one year experience in CICS and DL/1. I'm 25 and have no college degree. Will the lack of a degree restrict my career as a business programmer? I'm not interested in management, but in application coding and design.

A Although many of your peers have learned programming through on-the-job training, the overwhelming majority have a two- or four-year college degree, and many have graduate degrees.

Careerwise, you are competing with people who have more holes punched in their ticket. It is possible that your company's hiring and promotion policy will negate this advantage, but most don't.

Career goals are volatile, especially at your age. I would expect that within the next three to seven years your lack of a degree will cause you some disappointment in your career progress.

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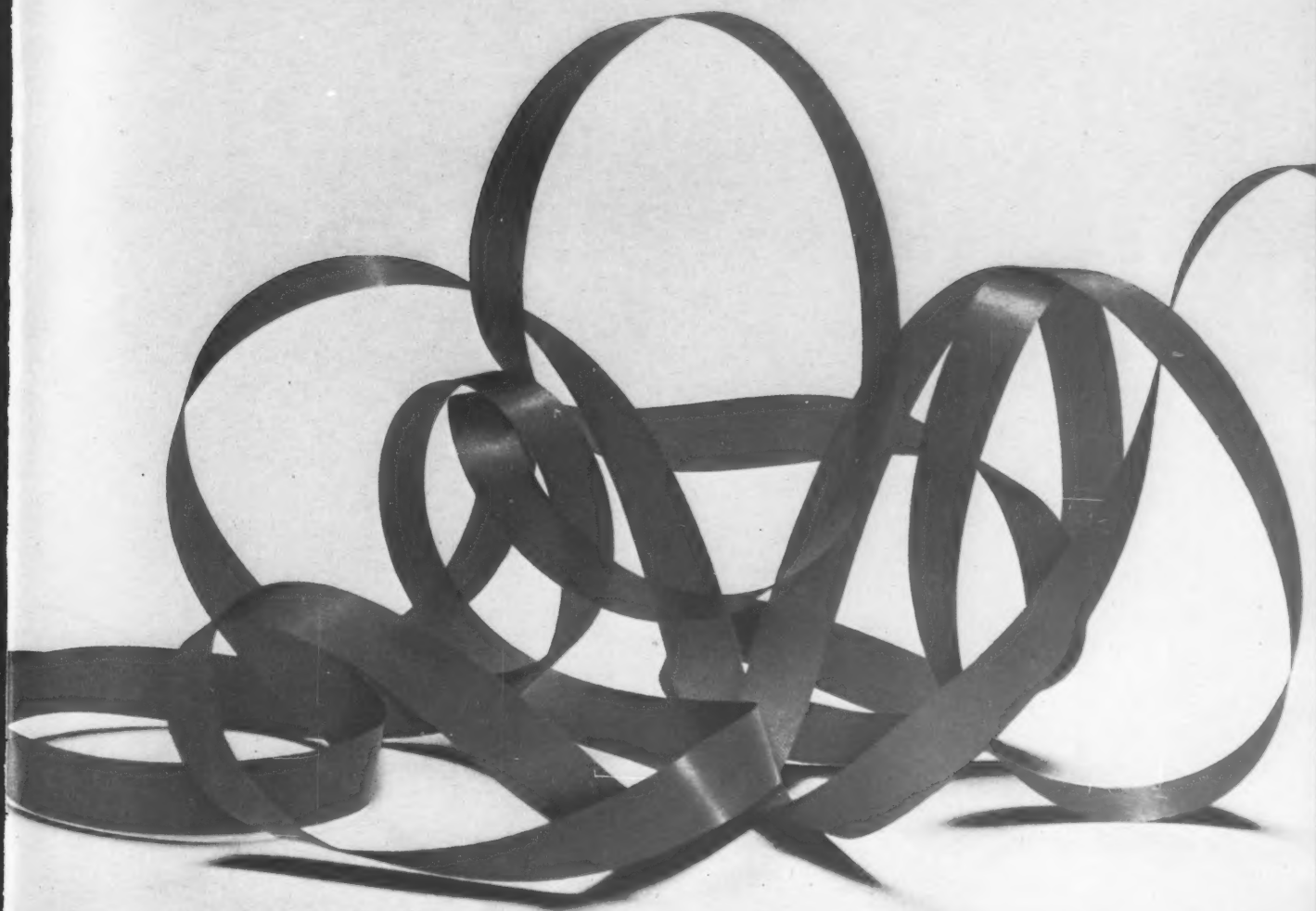
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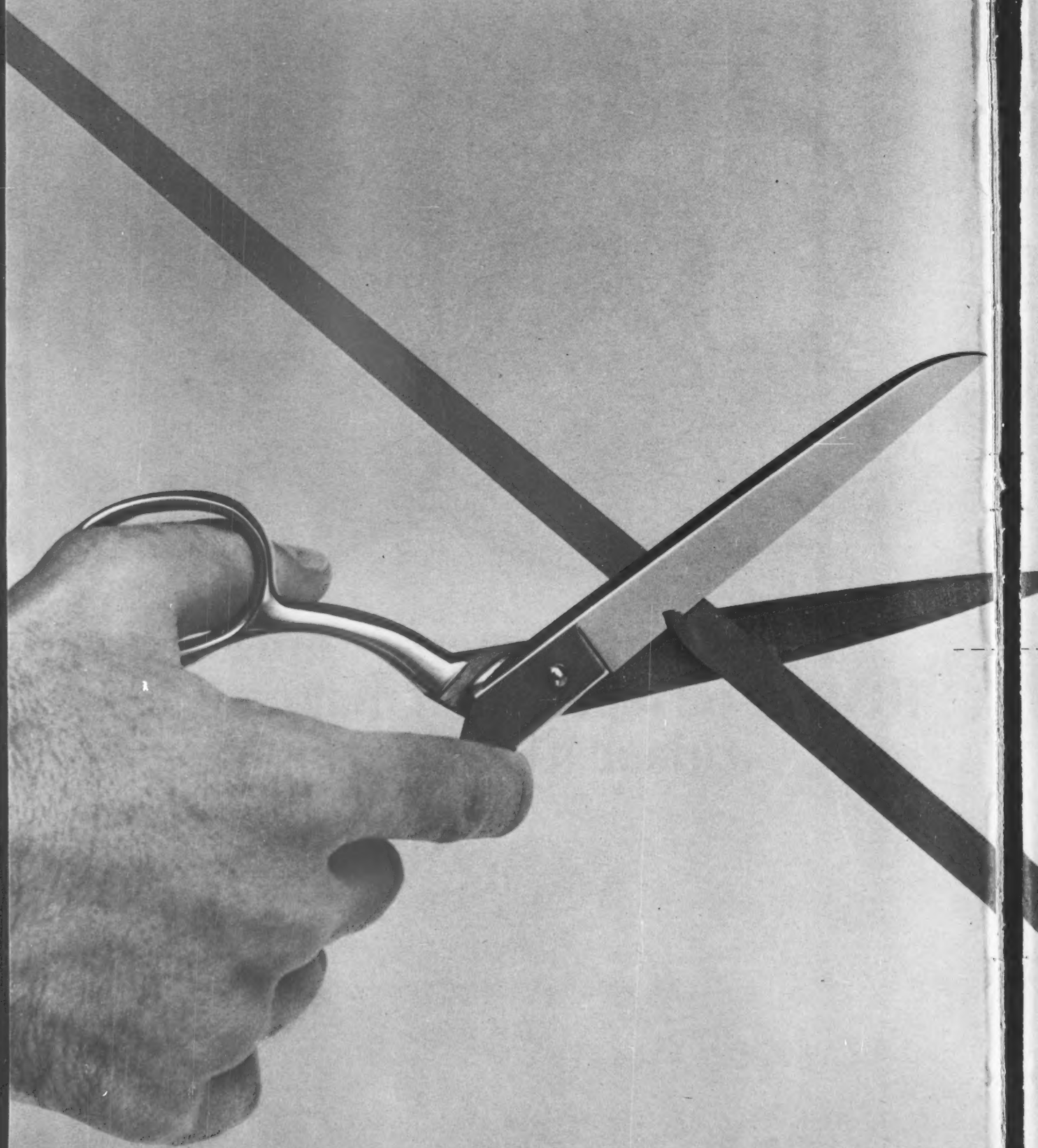
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Computerworld Extra!

Long is a professor at Lehigh University, a DP consultant and author. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, *Computerworld*, P.O. Box 880, Framingham, Mass. 01701.



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Calendar

Feb. 22-23, Sunnyvale, Calif. — **IMS Systems Management Workshop.** Contact: Sondra Schwartz, Boole & Babbage, Inc., 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Feb. 22-23, Los Angeles — **Word Processing Implementation Workshop.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

Feb. 22-24, Los Angeles — **Computer Control & Audit.** Contact: Joan Caulfield, The Foundation for Continuing Education, 25D Olympia Ave., Woburn, Mass. 01801.

Feb. 22-24, Cincinnati — **Fundamentals of Management for Quality Control Supervisors.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

Feb. 22-24, Boston — **Financial Analysis for the Systems Design.** Contact: Priscilla Goudreault, Education Coordinator, Q.E.D. Information Sciences, Inc., 180 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

Feb. 22-24, Washington, D.C. — **National Resources: Federal DP Expo.** Contact: Federal DP Expo, The Annual Conference and Exposition for the Federal DP Community, 160 Speen St., P.O. Box 927, Framingham, Mass. 01701.

Feb. 22-24, Atlanta — **Computer Controls: Management Measurement Effectiveness.** Contact: Arlene Glaser, Registrar, MIS Training Institute, Inc., 12 Juniper Lane, Framingham, Mass. 01701.

Feb. 22-24, Atlanta — **Auditing for Computer Performance.** Contact: Arlene Glaser, Registrar, MIS Training Institute, Inc., 12 Juniper Lane, Framingham, Mass. 01701.

Feb. 22-24, Atlanta — **Auditing Computer Procurement Process.** Contact: Arlene Glaser, Registrar, MIS Training Institute, Inc., 12 Juniper Lane, Framingham, Mass. 01701.

Feb. 22-24, New York — **Office of the Future Today.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

Feb. 22-26, London — **Structured Analysis Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Feb. 22-26, Chicago — **Structured Analysis/Design Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011. Also being held Feb. 22-26 at Myrtle Beach, S.C.

Feb. 22-26, San Francisco — **MVSP Internal Logic, System Design Performance.** Contact: Computer Systems Research, Inc., 195 W. Main St., P.O. Box 45, Avon, Conn. 06001.

Feb. 22-26, Madison, Wis. — **Quality Assurance & Testing Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Feb. 22-26, Atlanta — **CICS/VS Command Level Programming.** Contact: Robert R. Roebuck, Director, National Software Enterprises, Inc., 310 W. Lake St., Elmhurst, Ill. 60126.

Feb. 22-26, Los Angeles — **Predicting Throughputs, Response Times & Utilizations.** Contact: Institute for Software Engineering, Suite 200, 535 Middlefield Road, Menlo Park, Calif. 94025.

Feb. 22-26, New York — **Cobol Accelerated.** Contact: Boeing Computer Services Co., 560 Lexington Ave.,

New York, N.Y. 10022.

Feb. 22-26, New York — **Vsam Using Access Method Services.** Contact: I. Zelin, Comped, 1133 Ave. of the Americas, New York, N.Y. 10036.

Feb. 23, Nassau, Bahamas — **Computer Expo '82.** Contact: Expo '82, Suite 155, 1430 Miner Road, Des Plaines, Ill. 60016.

Feb. 23-24, Minneapolis — **Midwest Digital Equipment Exhibit and Seminar.** Contact: Bob Milano, Loonam Computer Terminals, 7720 Bush Lake Road, Minneapolis, Minn. 55435.

Feb. 23-24, Orlando, Fla. — **Computer Graphics: Applications, Current Technology and Implementation.** Contact: Martha Fort, Coordinator, University of Missouri,

Rolla, Mo. 65401.

Feb. 23-25, Phoenix — **Computer Graphics for Business.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

Feb. 23-25, New York — **Intermediate APL.** Contact: Numetrix APL Education, 22 E. 36th St. & Madison, New York, N.Y. 10016.

Feb. 23-25, Bahamas — **Computer & Automated Office Systems Exhibit.** Contact: Art Gasior, Ormand Vell Co., 8852 Leslie Lane, Des Plaines, Ill. 60016.

Feb. 23-25, Denver — **Comtec's 12th Annual Conference.** Contact: Comtec, Suite 200, 100 N. Winchester Blvd., San Jose, Calif. 95128.

Feb. 23-26, San Francisco — **Vtam:**

From Start to Finish. Contact: On-Line Software International, 65 Rt. 4 E. River Edge, N.J. 07661.

Feb. 24-25, Washington, D.C. — **Paperless Office.** Contact: Workshop Administrator, Micronet, Inc., Watergate Mall, 2551 Virginia Ave., N.W., Washington, D.C. 20037.

Feb. 24-26, Los Angeles — **Word Processing Supervision Workshop.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

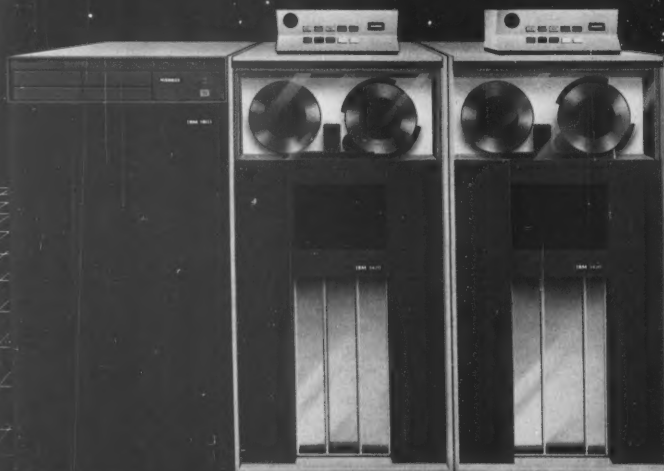
Feb. 24-26, Washington, D.C. — **Introduction to Statistical Analysis Systems.** Contact: Registrar, Applied Technology Associates, Inc., 1710 Goodridge Associates, Inc., McLean, Va. 22102.

Feb. 24-26, Short Hills, N.J. — **OS/**

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VS Job Control Language. Contact: Advanced Training Center, Division of Chubb Institute, 480 Morris Ave., Summit, N.J. 07901.

Feb. 24-26, Boston — **Vsam Performance Workshop.** Contact: Solutions, Inc., Box 989, Montpelier, Vt. 05602.

Feb. 24-26, Seattle — **Network Protocols.** Contact: American Institute for Professional Education, Carnegie Building, Madison, N.J. 07940.

Feb. 25-26, Orlando, Fla. — **Computer Graphics for Business.** Contact: Martha Fort, University of Missouri, Rolla, Mo. 65401.

Feb. 25-26, Boston — **Advanced Program Control Techniques.** Contact: Technical Marketing Society of

America, Department EUCSD, P.O. Box 91295, Los Angeles, Calif. 90009.

Feb. 25-26, Los Angeles — **Software Requirements Analysis and Design.** Contact: Data Processing Management Association, Department SRD, Suite 1016, 5959 W. Century Blvd., Los Angeles, Calif. 90045.

Feb. 25-26, New York — **Computers — Can You Afford Not to Understand?** Contact: Arthur Anderson & Co., Center for Professional Education, 1405 N. Fifth Ave., St. Charles, Ill. 60174.

Feb. 25-26, Dallas — **Developing and Implementing Purchase Order Management Systems.** Contact: Sylvia Vogelmann, Center for Retailing Management, 425 Park Ave., New York, N.Y. 10022.

March 1-2, New York — **Data Dictionary/Directory Systems: Evaluation and Selection.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

March 1-2, Los Angeles — **Computer Graphics & CAD/CAM Implementations.** Contact: Eloise Wenker, National Computer Graphics Association, 2033 M St., N.W. 300, Washington, D.C. 20036.

March 1-2, Denver — **Health and Ergonomic Considerations of Visual Display Units.** Contact: American Industrial Hygiene Association, John R. Conti, 475 Wolf Ledges Pkwy., Akron, Ohio 44311-1087.

March 1-2, Los Angeles — **SAS Procedure-Writing Course.** Contact:

SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

March 1-2, Williamsburg, Va. — **Software Cost Estimating.** Contact: Education Foundation of the Data Processing Management Association, P.O. Box 91295, 5959 W. Century Blvd., Los Angeles, Calif. 90009.

March 1-2, Rochester, New York — **Legal Fundamentals of Software.** Contact: American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

March 1-2, San Francisco — **Fundamentals of Data Processing and Telecommunications.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403. Also being held March 1-2 in Washington, D.C.

March 1-3, New York — **Information Systems Planning: A Structured Approach.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

March 1-3, San Francisco — **Data Processing: Fundamental Concepts.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

March 1-3, Chicago — **Teleprocessing Software: An Introduction to Concepts, Systems and Applications.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

March 1-3, Dallas — **DP Project Management: A Practical Approach.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

March 1-3, Edmonton, Canada — **Project Leadership Workshop.** Contact: BSI, 4720 Montgomery Lane, Bethesda, Md. 20814.

March 1-3, Boston — **Data Analysis.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, 180 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

March 1-3, Washington, D.C. — **Federal ADP Procurement Workshop.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

March 1-3, Chicago — **Capacity Planning and Modeling Workshop.** Contact: Sandra Schwartz, Boole & Babbage, Educational Services Division, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

March 1-3, New York — **Computer-Based Micrographic Retrieval Systems.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

March 1-4, Detroit — **Robots VI Conference and Exposition.** Contact: Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Mich. 48128.

March 1-4, New York — **IMS/VS and DL/1 Data Base Application Programming Class.** Contact: Sharon Stahlheber, On-Line Software International, 65 Rt. 4 E., River Edge, N.J. 07661.

March 1-5, New York — **CICS Application Design.** Contact: David Shapiro, SysEd, One Park Ave., New York, N.Y. 10016.

March 1-5, Portland, Ore. — **Structured Analysis Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

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EDITORIAL

Don't Tell Us — Ask Us

The Central Intelligence Agency said recently that a "hemorrhage" of U.S. high technology is speeding the Soviet military buildup. The intelligence community should be allowed to review the work of computer scientists and researchers before it is published to make sure it does not jeopardize national security, said the CIA's No. 2 man, Adm. Bobby R. Inman. Failure to reach agreement on this review process may well lead to harsh congressional legislation mandating scientific censorship, he warned [CW, Jan. 18].

The outrage in reaction to Inman's suggestion was predictable. Numerous researchers, computer scientists and DP professional organizations warned of the chilling effect even a voluntary, strictly advisory government review mechanism could have on scientific freedom.

A few in the scientific community who have worked with the government on sensitive technology development projects backed Inman's proposal, stressing the view that the U.S. must preserve its military — and economic — advantage.

Given this clatter of ill-conceived and poorly articulated arguments for and against government review of DP and electronics research results, we like the rationality of the response from Dr. Peter J. Denning, president of the Association for Computing Machinery [CW, Jan. 25].

Denning's response to Inman was to say, in effect, "All right, you have our attention. If there is really a problem concerning publication of our work, prove it. If you can do that and have a specific plan for solving the problem, let's hear it and we'll give it our serious attention."

But, as Denning did, we would add: "Don't try to tell us we are single-handedly arming the Soviet military; don't try to tell us we should keep scientific secrets from our allies because an economic advantage is crucial to national security; don't try to tell us our principles of academic and scientific openness are antithetical to national freedom; don't urge us to suppress our colleagues' research."

Above all, we would tell Inman that we don't like thinly veiled threats of government censorship or even harsher measures that a Congress, prodded by closed-door briefings from pinstriped gumshoes, might foist on us during a time of national hysteria.

If intelligence agencies are serious about this issue, let them bring it out in the open for everyone to consider. We promise we will be there to listen.

DATA PAST

Five Years Ago Feb. 7, 1977

DETROIT — A message recording/playback machine believed by Bell Laboratories to be the first application of magnetic bubble memory was being tested at the Michigan Bell Telephone Co. offices here.

Known only as the 13A Announcement system, the device was being used to record and then announce 12- or 24-second "call assist" messages such as "We're sorry. You have reached a nonworking number."

Ten Years Ago Feb. 2, 1972

NEW YORK — NCR Corp. and Control Data Corp. announced a joint venture, including the establishment of a joint peripherals manufacturing company and plans for the design of a full range of compatible mainframes.

WASHINGTON, D.C. — AT&T told the Federal Communications Commission (FCC) it cannot cite specific instances of harm caused to it by the direct interconnection of customer-provided equipment. The Bell system response was written after the FCC Common Carrier Bureau asked for details concerning harm caused by interconnected devices.

DETROIT — Burroughs Corp. capped its 800 family with the introduction of the B7800, a mainframe said to be in the performance range of the IBM 370/168.



LETTERS

Plight of the Unsung Heroes

Hats off to *Computerworld* for bringing the plight of data processing's often unsung heroes to the forefront in the article "Operations" [CW, Dec. 28, 1981/Jan. 4, 1982].

The account of the problems an employee desiring to build a career in computer operations faces today in terms of professional recognition, salary and upward mobility (especially with the general perception of computer operations by the data processing community) is, unfortunately, a dimly accurate portrayal.

A company's investment in the computer room today is enormous. There are so many ways that dollars can be saved with a really well-run operation — dollars that can make or break a company.

But all that most companies have come to expect from the operation is to get the work out somehow and, unfortunately, that's all that they often get.

The reason for this is inherent in the way that data processing is structured. All of the incentive career-wise is for the best operations personnel to leave the operation and go into other areas — and this in itself fosters several major problems.

First, the very best operations personnel never stay in operations long enough to become really expert. Because of the incentive system we've developed, they leave operations as soon as they can.

Second, this situation runs in a vicious cycle. The very best operations people leave the operation. Then the operation is left with less expertise — and the less expertise they're left with, the less professional and the less knowledgeable they seem to be.

Then, because they still manage to get the job done (albeit not as well as it could be), the perception that the group is not a professional one and that it does not require such knowl-

edgeable people is actually reinforced.

So, operations remains the traditional training ground for the other DP departments. And why not? There's no question that a good background in operations will make someone a better programmer or a better software, data base or teleprocessing analyst.

But therein lies the very essence of the problem — for it will also make that person a better operations specialist or manager. But with the present incentive system the person will inevitably go on to another area.

The importance of the computer operation to the very survival of the company is growing each and every day. More and more companies today are becoming increasingly dependent on the ability of the computer operations staff to perform their job — effectively, efficiently and on schedule.

It's about time that we in the industry stop and take note of this. It's time for us to cultivate an interest in upgrading, instead of demotivating, this vital department.

We have to encourage our younger, brighter employees to stay in operations and to build their careers right there in that department. However, to do this we have to provide the incentives.

We have to provide professional recognition and better salaries. We have to expend a greater portion of our budgets on the area of operations training and education and we have to design improved career paths within the operation itself.

There is a tremendous need today to begin by recognizing the importance of the operation and what must be done to develop its potential.

Leonard I. Eckhaus
President

Association for Computer
Operations Managers
Anaheim, Calif.



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SOFTLINE/Werner L. Frank†

'User-Friendly' and Friendly Usage

Have you noticed lately that all software is claiming to be "user-friendly?"

Presumably this means that the software will take into consideration the user's level of computer literacy and make it easy and pleasant to deal with the computer. Thus, we expect software to provide an appropriate interface that will facilitate man-machine communications.

In the event of errors, software should be forgiving by allowing escapes to prior points and retracing of steps already taken. It should also be sufficiently robust so that users cannot bring down the system or cause it to compute nonsense.

But can we overdo this business of user-friendliness to a point where we reach a state of diminishing returns?

We would probably all agree that a highly prompted, interactive screen-oriented system is the cornerstone for real user-friendliness.

To this we must add the capability of full-screen edit, controlled data entry points embedded in a nonerasable template and explicitly stated data entry formats with associated validation logic that prohibits entry of undesirable data types or data values. This structure was designed both to limit the actions of the user and to prevent the possibility of entering bad data.

What have we really accomplished? We probably have severely limited the flexibility and growth of the system. The features and facilities we have added will most likely get in the way of the user as his experience with the system increases over time.

Let me give an example from real life. In the process of defining requirements for a recordkeeping and reporting system, a financial expert indicated that each transaction

should have a unique identification number expressed in four digits. The programmer/analyst, to demonstrate the power and capability of the data entry validation facility of the data management system, immediately designated the ID field as numeric and, specifically, as a positive integer.

After spending a few weeks building the history file, the analyst discovered that some transactions were allocated to two different profit centers and therefore had to be divided into two separate records. In order to identify the transaction for accounting purposes, the numeric ID had to be enhanced by an alpha character. As the ID had now become an alpha-character string field, the definition of the file had to be revised and the file had to be rebuilt.

Catch 22 Aspect

This experience illustrates the Catch 22 aspect of designing user-friendly systems. The interactive prompts guide the user's data entry and processing steps to the narrowest limits and constraints possible, so that due edit and validation checks can be performed.

This specificity, however, is the antithesis of subsequent flexibility. It is difficult, if not impossible, to take ad hoc, dynamic changes after the system is defined and operational.

A second example illustrates how friendliness can sometimes make life too overbearing. A well-thought-out set of screens with associated menus and forms may be excellent for introducing a system to new users or refreshing the memories of prior users. But too much prompting can become a tortuous path for the experienced user. A truly friendly system must afford both intimacy as well as dis-

ance.

Therefore, the user should have shortcuts available and be able to bypass screens that overdo leading-by-the-hand. This can be accomplished by three techniques:

1. Allowing screen bypasses through multiple direct-entry points in the logical procedure.

2. Supporting command-level functions that take the place of specified screens.

3. Providing alternate screen logic and procedures that fit the preference level of the user.

In other words, an application should accept a variety of ways by which to communicate the demands of the user. A corollary to this would be the nicety of being able to dynamically modify both form and substance of screens once the application becomes operational in order to fit more closely the special needs of a specific user.

It may be correct to say that careful examination of requirements and careful development of functional specifications can avert the consequences of unforeseen situations popping up after the system is implemented. In other words, surprises can be forestalled by spending more time in requirements analysis, functional specifications and programming details.

However, this is easier said than done. While it is certainly true that more time spent in such design will minimize problems later, the typical user has very little patience or, for that matter, time to spend in studying his own problem. He wants to get on with the solution.

Even if the user were willing to sit still, carefully pondering his needs and postulating his requirements in order to come up with a "best" de-

sign, he still would suffer from myopia and the limits of the human capacity to understand completely and foresee all contingencies affecting his application problem.

Move Toward Implementation

For all the reasons above, I advise a rapid move toward some form of implementation, cursory though it may be. In other words, given a typical problem amenable to a solution with modern data management systems, the best advice is to select whatever system comes most easily, put up a model of the most likely application and play with it.

I literally mean, play. It is the actual hands-on experience of manipulating data from the point of view of entry, retrieval and reporting that provides the best and most convincing understanding of what is really desired and where the limitations might be.

With this type of heuristic experience, the user is best equipped to arrive at an acceptable solution. And it is best that the fewest constraints be imposed at the outset in order to allow for experimentation as well as to meet the eventual surprises that will surely arise.

Without a doubt, the prototyping promulgated here will both encourage better computer utilization and speed up the implementation process. Once the problem is really understood, adjustments and corrections can be made if the system allows or the file definition and file building activity can be restarted.

The user kids himself if he believes that he can get by with a "carefully" thought-out design and implement it all in only one pass.

Frank is executive vice-president of Informatics, Inc. in Woodland Hills, Calif.

READER COMMENTARY/Rex Malik†

Britain Wires Up for Information Technology '82

As I write, Britain's Minister for Information Technology, Kenneth Baker, is being interviewed on the *Jimmy Young Show*. Jimmy Young is a cross between Johnny Carson and a radio disc jockey who some weeks gets an audience made up of 20% or more of the UK's population. It is not a program that normally features computing.

In September, the London School of Contemporary Dance will perform a ballet into which computers have been built: It has been created around them. The computers will be on stage and the dancers will dance with and around them. Some of the computer output will be projected on a backcloth, and there is currently some discussion of the feasibility of wiring up the audience to gauge and display their combined emotional reaction.

These are but two of the events in Information Technology Year '82, a massive UK education campaign to sell the British on the benefits of using information technology.

And what is information technology?

Baker described it as "the application of microelectronics to the handling of information by combining computing and telecommunications in order to produce, process, store and transmit words, numbers, voice and pictures — reliably, quickly and economically. Information technology is," he continued, "the most revolutionary marriage of skills seen this century. The changes and benefits it will bring will be as profound as those of the industrial revolution."

Public Awareness Campaign

Perhaps this is why information technology cannot just be allowed to happen, why there has to be a public awareness campaign. In a background document, the steering committee indicates that research has shown most people in the UK have as yet little idea of what information technology is about, while more than 50% of British firms are still not us-

ing microelectronics or information technology in any way. As the minister put it, many companies are just getting around to their first electric typewriters.

There should be little excuse by year's end for ignorance. The program that has been put together is massive, well-funded and tailored to suit many tastes.

The program has been created by a central steering committee involving both government and private industry, education and the unions. Its chairman is a former director of the UK's Computer Services Association, Alan Benjamin, now communications director of one of Britain's major software houses, CAP.

The Information Technology Year '82 project has a full-time director and is well staffed. Both the city of London and IBM have given it the service of a full-time senior executive for a year and companies like NCR Corp., ICL Ltd. and the software house Scicon are expected to follow suit. They will be needed, for besides

a national program of events, there are also seven regional committees, each with its own additional program.

Funds have come from both government and private industry. The project begins with around \$2.3 million to \$2.5 million, with each half to be contributed by government and private industry. The project director, Kenneth Barnes, who is also the founder of one of UK's major software houses, SPL, estimates that he will spend at least twice this amount. Those are the funds the committee will dispose of directly. Considerable sums are also being spent under other headings.

The central government has tied into the project their investment in computers for schools. The intention is that every school in the UK should have at least one microprocessor in use for teaching purposes by the end of the year, and the government is prepared to pay half the cost of providing them. Special provision is

(Continued on Page 27)

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	APR.	26-28	BOSTON
	MAY	10-12	NEW YORK

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MAR.	17-19	CHICAGO
APR.	14-16	BOSTON
APR.	21-23	WASHINGTON
MAY	3-5	DALLAS

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MAR.	17-19	CHICAGO
APR.	21-23	SAN FRANCISCO

Introduction to Micro/Personal Computers: Application, Selection and Usage Guidelines

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MAR.	29-31	WASHINGTON
APR.	12-14	NEW YORK

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sws/

Britain Readies for Information Technology '82

(Continued from Page 25)
also being made for teacher training. The total cost could be millions of dollars.

There is to be a major traveling automated office exhibition: six 47-ft road trailers on a nationwide 37-week tour visiting many of our major shows and fairs. The cost is expected to be about \$2 million.

The British Broadcasting Corp. is making its own contribution separately. They have designed their own 8-bit microprocessor. It is British-manufactured and although they are known to have run into chip-yield problems — problems we are constantly being assured have been overcome — this has not affected the order book.

Even before the first machine has been delivered, the order book is reputedly for more than 30,000 machines.

Television Series

That system lies at the core of a widely publicized 10-part mass appeal television series, *The Computer Programme*, which is aimed at a lay audience and devised to outline the basic elements of computing and make them entertaining.

The program deals with storage, communications, languages and artificial intelligence. It will teach elementary hands-on computing, including some of the basic elements of programming. The government, too, plans to increase the number of New Technology Centers, the minister indicated.

These centers are one of the most interesting training schemes so far devised anywhere. They arise from the creation of one such center in West London, a center that has been markedly successful.

That center takes unemployed teenagers without any school qualifications and teaches them basic electronic and computing skills. Practically all of its students end up in useful employment.

The government has been so impressed by the success of the first center that it initially approved the creation of 20 more. That was increased to 30. Now the minister has announced that we are to have 100 such centers.

The Information Technology Year '82 program includes displays at most of the major shows and exhibitions to be mounted in the UK this year.

At the Ideal Home Exhibition in London in March, the country's largest house builders will be showing a home with built-in information technology.

If British Telecom's objections to automatic dialing can be overcome in time, the house is expected to be equipped with a talking-house facility. The roof comes equipped with sensors linked into a microcomputer.

At the first sign of trouble — for instance if the roof leaks — the system will contact the owner of the house and ask if it should call

someone to repair the roof. More conventionally, it will be equipped for working with computer systems from home.

There will also be a large traveling Design Council exhibition featuring the best designed products, displays, newspaper supplements and even two Information Technology Year '82 stamps to be issued by the Post Office in

the fall.

The other stream is that of business and industry. Here they have latched onto almost every conference and seminar going: Bankers, electrical engineers, management consultants, chartered accountants — all will have information technology as part of their theme this year.

The campaign is enthusiastically backed by every com-

pany that can claim to play some role in information technology. Naturally enough, there is immense co-operation.

The project will end with a major conference in London on information technology at which we are promised a speech from the Prime Minister.

Malik is a free-lance computer journalist based in London.

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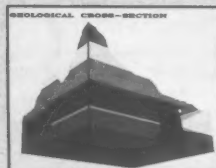
Precision Visuals' software tools are standardized, user-callable subroutine packages. They will save you hundreds of programming hours by forming the foundation of your graphics application programs. Their unique distributed-network design provides extraordinary economy of computer resources.

2. Versatility

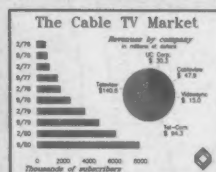
Precision Visuals' software tools provide the capabilities for performing virtually any graphics application: full-color, 3-D, dynamic image manipulation, full access to graphics input, graphics data structuring, a device-independent picture library, a business graphics vocabulary, and much more.

3. Adaptability

Precision Visuals' software tools currently run on 15 different computer systems, driving 26 different graphics display devices. They take full advantage of today's—and tomorrow's—most sophisticated graphics hardware, and are upward compatible with emerging hardware technologies.



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4. Simplicity

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5. Application Independence

Precision Visuals' software tools are being used in virtually every major industry, including aerospace, energy, communications, engineering, government, service bureau, systems integration and education... for applications such as computer-aided design, business graphics, process control, mapping, geological data analysis, and document layout. In fact, Precision Visuals' software tools have become the corporate-wide graphics standard for many of our customers.

Precision Visuals is the pioneer in graphics software tools. We have earned a reputation for doing a good job for demanding customers (our customers particularly appreciate our emphasis on documentation and support).

To learn how you can streamline your graphics applications using Precision Visuals' family of graphics software tools, including DI-3000™—the core system, and GRAFMAKER™—the business presentation system, call Geoff Scott at 303/449-0806.

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Dr. Richard R. Sochak, President
Research Information Corporation
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HUMAN CONNECTION/Jack Stone†

Is the Manager the Problem DPer's Problem?

First, may I thank the vast reading audience of *Computerworld* for all the cards and letters of comment on my article "Problem DPer Reforms for the New Year" [CW, Jan. 11] covering the "problem DPer" and his recent, agonizing conversion to the computer faith.

The following letter from Bill Delaney, president of Analysis and Computer Systems, Inc., Bedford, Mass., captured many of the thoughts that were expressed:

"Your article concerning the 'problem DPer' who finally found his place and is content after 12 years of self-admitted failure is heartening to read. I wish him continued satisfaction and success. Even though his salary is now less than half of what it was, he is more content, due to factors that are far more important to him than salary.

"His experience is further proof that many individuals work for reasons other than money. Survey after survey indicates that:

- "Managers generally are more money or bottom-line-oriented than nonmanagers. This is, in part, what makes them good managers.

- "Less successful managers try to transfer their personal reasons for working to their employees and it just does not work.

- "Money alone is a very poor motivator for most people. Most nonmanagers identify other factors that motivate them, like interesting work, an understanding supervisor, good working conditions and pleasant co-workers.

"So the 'problem DPer' learned that financial income was not his primary motivator. His situation was not unique, although it was unusual that it took him 12

years to figure it out.

"Most employees discover this early on, although, for some strange reason, most managers do not. Managers seem to continually try to force their own motivators on their subordinates when they don't really apply.

"A kind word, a letter of appreciation, a pat on the

back — all go a long way toward employee motivation. It is a plain fact that a manager who only criticizes and never compliments will reap the rewards of high turnover no matter how much the employees are paid.

"Receiving loyalty from 'below' will not happen until loyalty flows from 'above.'

The boss can only earn loyalty through a positive attitude and behavior toward his people over the long term.

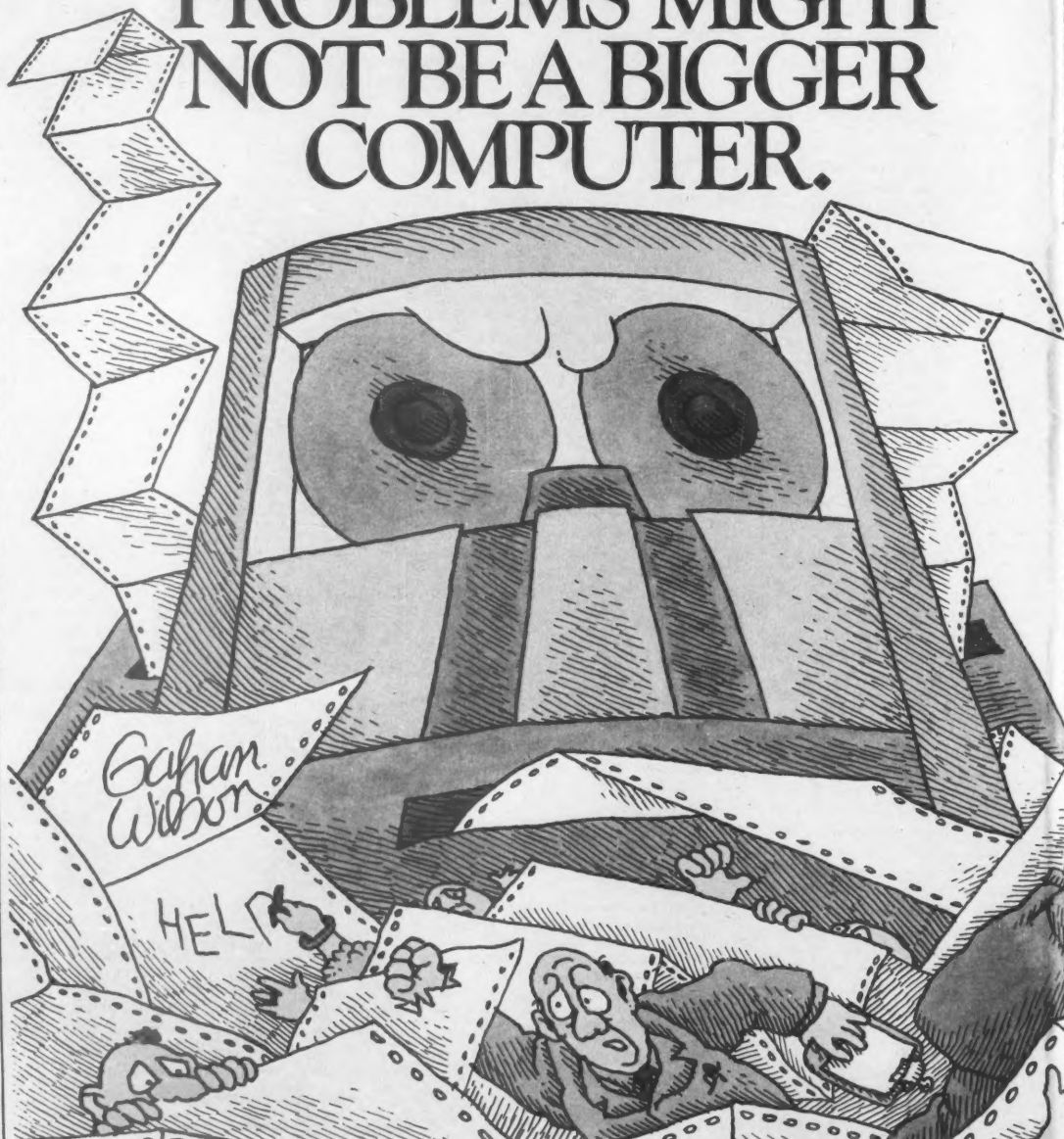
"When any boss says, 'Why do I have to compliment them? They get paid to do it right!' an atmosphere of distrust builds that causes employees to look for greener pastures, which does not

necessarily mean a higher paying job.

"Here's a thought that I have found helpful: Just by asking one directly what one wants from the job will trigger discussions that will help resolve dissatisfaction."

Letters to Stone should be addressed to Box 207, 1377 K St., N.W., Washington, D.C. 20005.

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Phase of the '80s?

I just finished reading "Job Burnout: It's Becoming an Epidemic in DP Centers" and "Jobs Taking Mental, Physical Toll on DPs" [CW, Jan. 11] and I must say, I had a good chuckle doing so. It's not that the writer intended to be funny, mind you, but his oh-so-serious attitude throughout the piece was curious. Where has the writer been for the last five to seven years?

Having been a teacher in the public schools before

changing careers three years ago and entering the computer field, I am well aware of the burnout phenomenon.

Teachers have been talking and writing about it for years now. To imply, as the writer does in the statement, "the condition is believed to be especially pronounced among members of the computing field," that this is somehow unique in the data

LETTERS

processing profession is to ignore all the literature written in the area and to show the degree to which the writer is suffering from the insidious effects of terminal-tunnel-vision.

Every occupation these days is suffering from burnout of one sort or another. Just read your local newspaper. It's the disease of the '80s or haven't you heard?

First there were ulcers, then back troubles, then communications breakdowns (a late '60s disease) and so on.

I'm not saying the writer is incorrect, of course, but a look at the facts tends to make the use of words like "insidious", "disease", "contagion", "malady" and so on seem a bit heavy handed.

Society as a whole, it seems to me, is like a perpetual

child, going through this phase or that, some better and more constructive than others, but all more or less temporary. Our phase right now is that of burnout. But this too shall pass. What the next one will be can only be guessed.

Jeff Merrill

Systems Analyst

Control Data Corp.
Sunnyvale, Calif.

Exercise Regularly!

I've just read the articles about job stress and burnout [CW, Jan. 11]. I, like Mary in the article "Jobs Taking Mental, Physical Toll on DPs," have physical symptoms and have been under a doctor's care for more than a year for job-related stress.

I'd like to pass along another partial solution. Computing managers: Encourage your employees to exercise regularly! And employees: You owe it to yourself (and your company) to burn off some of that tension.

Aside from the obvious health benefits, I've found that the exercise helps my productivity. I am fortunate to work for a company with flextime, and I swim at lunch four or five days a week now.

I plan to make regular exercise a lifelong habit, and an employer who is supportive about it is near the top of my list of companies and managers for whom I would work.

Barbara Zanzig
Software Engineer

Tektronix, Inc.
Beaverton, Ore.

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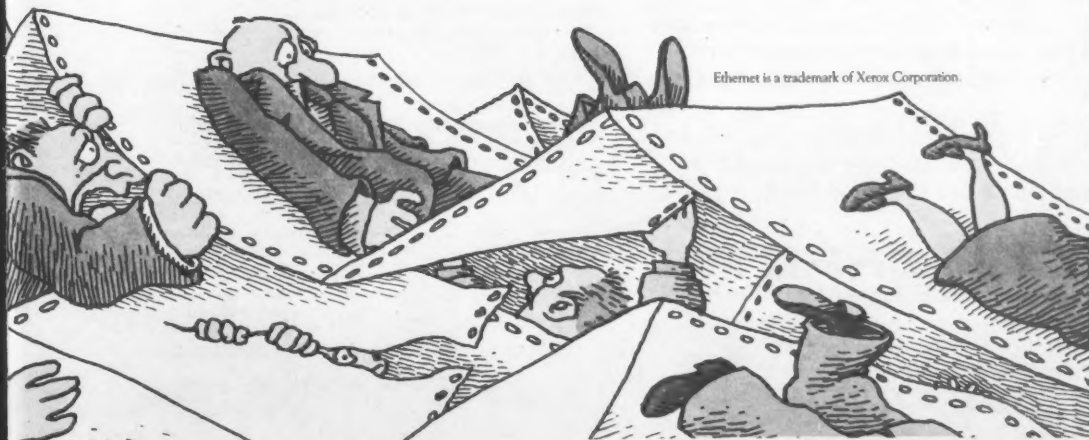
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CW 0201

Programmer Shortage Cited Packages Prescribed for Software Crunch

JACKSONVILLE, Miss. — Considering the growing shortage of qualified programmers, there is a tremendous amount of discussion concerning the use of software packages these days, according to Mike Sisco, vice-president of systems for Business Data Services, Inc. here.

As technology moves the computer to all facets of our lives, more programmers will be needed to develop the software, Sisco said recently. The tremendous impact on the requirements for qualified programming talent will intensify during the 1980s.

Since the requirements for software have increased at a faster rate than the industry could produce over the past few years, packages have been more

readily accepted, he explained. In many cases, businesses have been able to save thousands of dollars while bringing their systems up much more quickly.

He cited several key reasons for a company to consider installing a packaged solution before reinventing the wheel.

- **Cost.** A software firm can sell and install a package at a much lower cost for a company than it could develop a comparable system. It may take the software firm thousands of dollars to develop a system, but by installing it in several locations, the firm is able to recoup its investment while offering the package at a substantially lower cost to the user.

- **Time Frame.** A package goes in much quicker than developing from scratch, provided the

software firm has a well laid out implementation plan and experience in working in the particular industry the user happens to be in.

- **Program Maintenance.** Maintaining programs is becoming a very time-consuming process. Some software firms offer continuing support services that include the maintenance of programs required due to government regulations, industry changes and so on. This relieves the user of hiring a programmer or contracting for that service.

- **Ongoing Enhancements.** Many firms offering packaged software to specific industries provide for future capabilities as integral parts of their marketing support. This can be a highly valuable commodity to

the user.

For example, a software firm may make a \$50,000 to \$100,000 investment to develop a point-of-sale application that ties into their industry-oriented package.

However, the application may be offered to users for \$3,000 to \$5,000 because the software firm plans on selling that one application to 100 users and prospects over a period of several years.

- **Industry Expertise.** For the first-time user, developing a system from scratch could create quite a bit of frustration and economic loss by learning the hard way.

The new computer user may not really know the do's and don'ts in developing a system with future changes, growth and flexibility in mind. The software house has learned these things through experience and therefore will have a much higher success ratio in developing new applications.

In addition, many companies rely heavily on the industry knowledge of the software firm to help them in the operation of their business.

- **Proven Software.** There are no guarantees that the end result of developing a system will turn out to be the product designed at the start of the project.

Support Extended to Cobol Users

• Testing Aid Backs Users at DOS Sites

NEW YORK — A testing aid for Cobol and assembler for use on IBM DOS systems has been introduced by The Productivity Group, Inc.

Fixit was designed to correct data exceptions, decimal divide exception and decimal overflow exception. It reportedly provides a snapshot dump of storage, corrects the fields causing the exception and returns control to the problem program if the exception is correctable. If the exception is not correctable, the vendor said, Fixit provides a full storage dump and the job is terminated.

Fixit will detect and correct a maximum of five unique problems in one test, the vendor said. Reportedly if a program check occurs at the same address as a previous program check, only corrective action is taken.

The software is available in source code form with accompanying user notes for \$500 from the vendor at Suite 1140, 373 Fifth Ave., New York, N.Y. 10016.

• 'Tracmacs' Designed to Cut Testing Costs

VALLEY FORGE, Pa. — A package designed to attack the cost of testing and maintaining programs on any system with a Cobol compiler was introduced here by Management and Computer Services, Inc.

Tracmacs is intended to help systems designers and programmers audit the quality and completeness of software testing and to test data to ensure that a program has been thoroughly tested, the vendor explained. The package works in conjunction with the vendor's Datamacs automatic test data generator.

Tracmacs is a logic-path analyzer that shows at the condition-statement level which paths have yet to be tested, which decision paths were executed and in what sequence and charts the number of times the true or false branches were executed, the vendor said. It essentially provides an audit of each program execution at the conditional level, a spokesman added.

The package can be used in the maintenance environment

for existing programs to document what a program actually is doing, the vendor said.

Tracmacs is sold as an option to Datamacs for \$6,000 or as a stand-alone package for \$12,000. The vendor is at 74 Great Valley Corporate Center, Valley Forge, Pa. 19482.

• Block Orientation Offered as Crown Cobol

FORT WORTH, Texas — Logistar Software Co. here has introduced Crown Cobol, a language designed to give Cobol a block orientation similar to Algol and Pascal.

Cobol functional statements such as MOVE, COMPUTE and READ still are included in Crown Cobol, but control statements such as IF, GO TO and PERFORM UNTIL have been replaced with three structure symbols and a special abort statement to provide instant structure recognition and direct coding of structured programming control-logic structures, the vendor said.

Loops, choices and sequences are all nestable within one an-

other, a spokesman added, and all such nested blocks may be named. Each block is said to have an implicit terminator that marks its end.

The language provides for deeply nested choice statements, symmetrical structures and the elimination of GO TO statements, according to the spokesman. Subroutines do not have to be limited to an arbitrary 50 lines or so of source code, he noted.

A Crown-to-regular-Cobol source translator is offered for most mainframes and is available under a permanent license for \$6,500, the vendor said from 6412 Whitman, Fort Worth, Texas 76133.

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System 80 Gets Accounting, Wholesaler Tools

BLUE BELL, Pa. — General accounting and wholesale management packages for Sperry Univac System 80 users were announced here by the computer vendor. In ad-

dition, the Escort programming language was introduced for the System 80.

The accounting package, Accounting Management System (AMS 80), reportedly

includes the basic modules of accounts receivable, accounts payable, general ledger and payroll for the System 80.

It uses RPG-II and is said to offer menu functions and screen operations with prompting and error-checking capabilities.

Wholesale Applications Management System (Wams 80) includes the separate modules of inventory/sales analysis, order entry, billing, credit return and expanded sales analysis, the vendor said.

The Escort language report-

edly enables users with no previous programming knowledge to use the system via a tutorial conversational mode.

Escort reportedly can be used for inquiry into existing data files, report preparation, creating and updating data files and for validating program file updates.

It is said to feature automatic formatting of the screen and printer output from the structure definition, as well as arithmetic and conditional functions incorporating addition, subtraction, multiplication and division with

automatic decimal point alignment, algebraic expression and conditional clauses.

The monthly license fee for AMS 80 for the four modules is \$395. The Wams 80 monthly license fee is \$425 for the four modules. Modules may be ordered separately or in any combination. The Escort language is available for a license fee of \$48/mo or \$2,304 for an extended term license.

Initial deliveries are expected to begin in March, according to the vendor, which can be reached through P.O. Box 500, Blue Bell, Pa. 19424.

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Enhancements Added to 'Soloman'

PHOENIX — Information Systems Consultants, Inc. here has announced Release 2.1 of its Source and Object Library On-line Manager (Soloman) on-line program library management system for Honeywell, Inc. Level 66,

66/DPS and DPS 8 computer systems running under Gcos.

Soloman reportedly establishes a central library of source and object programs, job control language (JCL), files, alter files and data files. It is said to provide documentation for project control, including directory listings of the status of programs and their required files.

The package's security features include backup versions for production program systems and protection against unauthorized modification of production program systems, the vendor

said.

Among its reported features are automatic creation of JCL for remote job submission, on-line setting of compiler and run-time options, audit trail provision for activity against library members as well as for individual terminal sessions and separation of user libraries for development and production projects.

Soloman is available on a license basis for \$7,800 and maintenance is \$950/year after the first year, the vendor said from Suite A, 6812 N. 19th Ave., Phoenix, Ariz. 85015.

Wintek Offers Assembler

LAFAYETTE, Ind. — Wintek Corp. has announced a macro assembler for its Sprint 68 development system that is said to extend support to the Motorola Corp. 6805 and 146805 or similar microprocessors.

The macro assembler is said to include the features of the 6800 version, such as the

generation of relocatable linkable object code, according to the vendor.

The Sprint 68 development system with dual 8-in. drives and 48K-byte random-access memory costs \$3,945, the vendor said.

Wintek is located at 1801 South St., Lafayette, Ind. 47904.

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DBMS: Exploring the Issues — Part 3

Applications Developer Offered Many Choices

By C.W. Holsapple
And A.B. Whinston
Special to CW†

The development of applications software is a collaborative venture involving the development tool's author, the applications developer and the end user.

Having identified the role of a data base management system (DBMS) as an applications development tool and the major needs of an applications developers [CW, Jan. 18, Jan. 25], we have a basis for making an intelligent assessment of various DBMS approaches.

Our intent is not to provide a final answer on which data base management approach (or system) is the "best," but to examine each of the applications developer needs and cite examples of how these needs can be met with a DBMS.

Historically, Cobol (and its compilers) has been the predominant applications development tool. As such, Cobol can be evaluated with respect to how well it meets developer needs.

Cobol Limitations

It is sufficient to say that Cobol is a file management system and has many limitations with respect to these evaluation guidelines. It was precisely these limitations that led to the appearance of DBMS that overcome (in varying degrees) the data handling limitations of Cobol and other programming languages.

An applications developer typically uses a DBMS in tandem with a host programming language, allowing a facile interface between the data handling mechanism (furnished by the DBMS) and the menu logic, computation and report formatting mechanisms (furnished by the host language).

One other type of software product should be mentioned in passing: stand-alone file management systems. Although these are often marketed as DBMS, they are, nevertheless, merely systems for defining

In this final part of their series on data base management systems, Holsapple and Whinston attempt to match applications developer's needs with particular DBMS approaches.

disjoint files, extracting data from a file and (sometimes) merging new files on the basis of a redundant field.

The masquerading of a file management system as a DBMS is especially common in the micro- and minicomputer realms. They arose in response to the explosive growth of computer availability and the accompanying shortage of skilled personnel. They allow an unskilled person to do some of the data handling that can be done with Cobol, but without any programming.

It would be unfair to a stand-alone file management system to evaluate it in terms of applications developer needs, as it would do very poorly.

The user of a stand-alone file management system is someone with very little computer expertise: an end user. It is therefore best characterized and evaluated as an applications system.

The application is not for accounting, inventory control or personnel management, but for file management. It allows an end user to store, modify and acquire data with little concern about data structures, data handling and programming.

Meeting Other Needs

While it may be viewed as being fairly successful in meeting the first end-user need — ease of use — a stand-alone file management system does not fare as well with respect to the second, fifth and sixth needs. If data security and integrity features are provided at all, they are generally quite meager.

With respect to performance, an

end user must compare a stand-alone file management system against the alternative.

For instance, which performs better: a file management applications system using accounting files or a professionally developed accounting applications system (based on a genuine DBMS)?

From the standpoint of extensibility, a stand-alone file management

system is an off-the-shelf applications system and therefore not oriented toward modification.

Holsapple is associate professor of business administration at the University of Illinois at Champaign. He is presently visiting associate professor of management and computer science with Purdue University. Whinston is a professor of management and computer science at Purdue University.

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'Harvard Business Review' Keyed for Leased Data Base

CAMBRIDGE, Mass. — Business Research Corp. has announced the completion of the *Harvard Business Review* data base, a single-journal data base available for corporate leasing and loading on in-house information systems.

The *Review's* data base will also be available on one of the national time-sharing systems. Negotiations are now under way with both Dialog Information Service, Inc. and Bibliographic Retrieval Services, Inc., according to Business Research.

The data base reportedly provides eight separate search strategies through the use of controlled vocabularies that allow the user to find information contained in a *Review* article.

According to Business Research, one controlled index lists 1,500 orga-

nizations that are discussed in one or more of the *Review's* articles. Another controlled index is said to list some 600 products, services and brand names. Each record in the data base reportedly contains the standard bibliographic information about the article.

Order Service

Another reported feature of the data base is an on-line document order service that allows the researcher to obtain copies of the *Review* article mailed on the day of request.

The annual cost of private file leasing is \$750.

A set of *Harvard Business Review* file specifications and related documentation is available from Business Research, 1660 Soldiers Field Road, Boston, Mass. 02135.

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AA - 2

'Pacs' License Fee Increased

SANTA BARBARA, Calif. — Signal Technology, Inc. has increased the one-time license fee for its Process Accounting and Chargeback System (Pacs) from \$3,900 to \$4,900.

Pacs reportedly provides users of the Digital Equipment Corp. VAX-11/750 processor with systems resource monitoring on a per use, per project and per facility basis and charges back resource usage to system users.

Capabilities added to the system include a budget-checking option and data editor programs that allow VAX system managers to maintain current user information, the vendor said.

Signal Technology is at 15 W. De La Guerra St., Santa Barbara, Calif. 93101.

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Financial Planning Package Designed for PDP-11s, VAX-11s

DENVER — Finar Systems Ltd. has announced a financial planning package for use on Digital Equipment Corp.

PDP-11 and VAX-11 systems that is designed to give first-time planners access to modeling capabilities.

Worksheet Evaluation and Review (Worker) reportedly provides arithmetic, report formatting and graphics capability to conduct spreadsheet manipulation of the type associated with planning and budgeting tasks.

The vendor said that as the planner's need for more sophisticated analytical techniques increases, Worker can be upgraded to its financial analysis and reporting package without modification to existing Worker models.

Worker is available for about \$5,000 from Finar Systems, Suite 2-300, 6000 E. Evans, Denver, Colo. 80222.

Graphics Subroutine Fits DEC VT105 Terminal

WILLERNIE, Minn. — Tri-Systems Engineering here has announced VTplot, which it described as an RT-11/Fortran callable subroutine package for Digital Equipment Corp.'s VT105 graphics terminal.

Functions reportedly include point, vector, graph and strip chart drawing in any of the DEC VT105 modes. Axes and markers can be set or erased.

VTplot is provided on an RX01-compatible diskette along with a demonstration program, the vendor said. A single-site license sells for \$70. A complimentary users guide detailing the calls will be provided on request by Tri-Systems Engineering, P.O. Box 784, Willernie, Minn. 55090.

Directory Of Software Now On-Line

FORT COLLINS, Colo. — Imprint Editions has announced that the "International Software Directory" is now available as an on-line data base accessible through Lockheed Dialog Information Services, Inc. The directory reportedly lists tens of thousands of software packages and classifies them by machine, operating systems, subject, vendor and price.

The directory is also available in two volumes. The "International Microcomputer Software Directory" contains 7,000 programs and is available for \$34.95 plus \$2.95 for postage and handling. The "International Minicomputer Software Directory" is available for \$65.

Imprint Editions is located at 420 S. Howes, Fort Collins, Colo. 80521.

Directory Aimed At Construction

SILVER SPRING, Md. — A directory of software packages for construction contractors has been published by Construction Industry Press.

"The Construction Computer Applications Directory" contains listings of more than 1,000 programs written by more than 150 vendors. Included are products for microcomputers, minicomputers and mainframes.

Also included are two yearly updates and a section called "A Software/Hardware Evaluator for Construction Users."

The directory costs \$95 from Construction Industry Press, 1105-F Spring St., Department D, Silver Spring, Md. 20910.

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And 'Help' Capability 'UCC Twenty' Gets CICS Front End

DALLAS — University Computing Co. here has added a CICS front end to UCC Twenty, its IBM OS JCL generator package. The on-line front end reportedly features a series of formatted screens for entering variable input that enable users to add a new job; delete, update or browse an existing job; and copy from an existing job to a new job name.

A "Help" capability also is available, the vendor said, and can be accessed from any screen. The information presented is said to be a subset

of the UCC Twenty user guide and is designed to answer questions that arise when entering data.

As the data is entered, the input fields are validated for syntax and edited against the user-desired JCL standards, according to the vendor. If errors are detected, each field in error is highlighted and error messages are displayed on the screen.

The UCC Twenty generator combines variable job information with data extracted from the UCC Twenty standards file, creates OS JCL for the job and produces a report that documents any errors or unusual conditions encountered, the vendor explained.

UCC Twenty can be installed on any IBM or plug-compatible mainframe running DOS, OS or OS/VS. The system is written in Cobol. The on-line modules require CICS level 1.4 or greater, as well as the Vsam access method.

The UCC Twenty OS JCL generator is sold with UCC Two in support of the DOS to OS transition effort, the vendor said. UCC Twenty is available only to new or current UCC Two clients. The system is priced at \$10,500 or \$460/mo on a 36-mo payout plan.

University Computing is located at UCC Tower, Exchange Park, Dallas, Texas 75236.

Package Tracks Travel Expenses

LONDONDERRY, N.H. — Interactive Computer Systems Corp. has announced its Employee Receivables and Travel Expense Control System, offered in versions for IBM and Digital Equipment Corp. computers. The software features on-line capabilities for control of employee business travel and related expenses.

The system reportedly provides the audit control necessary to manage costs and provides reports that allow the negotiation of less expensive hotels and car rentals.

Depending on the options selected, the software ranges in price from \$25,000 to \$35,000. Interactive Computer Systems is at Park II W., Rt. 102, Londonderry, N.H. 03053.

IBM 5280 Gets Emulation Utility For System/34

JEFFERSON CITY, Mo. — Software Systems, Inc. has announced a System/34 Emulator Transfer Utility for the IBM 5280 Distributed Data System.

The utility, running in conjunction with the firm's 5251 Emulator program product, is said to support the transfer of data between the System/34 disk and the 5280 diskette drives while the 5280 is emulating a 5251 Model 12 remote workstation.

The utility also allows the System/34 to allocate, delete or test a 5280 diskette data set, the vendor claimed. The utility reportedly does not require specialized programming on the System/34 and can be executed from either a System/34 menu called from a procedure or requested directly from the command display.

The utility carries a one-time license fee of \$350 from Software Systems, P.O. Box 1766, Jefferson City, Mo. 65102.

System/34 Gets Account Package

SALT LAKE CITY, Utah — Software Clearinghouse, Inc. is offering its Resource Time Accounting system on IBM's System/34.

The package reportedly accumulates information about CPU and terminal usage. It has the ability to report daily and monthly usage by user/job, primary procedure and division, the vendor said.

The price of the accounting system is \$400, the vendor said from Suite 400, 2290 E. 4500 S., Salt Lake City, Utah 84117.

System/34 Package Restarts Procedures

WORTHINGTON, Ohio — A package for IBM System/34 users that restarts a procedure after the last successfully completed job site has been announced by Dimension 4 Design Group.

Restart is said to provide information to help make needed changes before a procedure is restarted. No programs or utilities are changed in any way, according to the vendor.

Restart costs \$105 from Dimension 4, 1018 Proprietors Road, Worthington, Ohio 43085.

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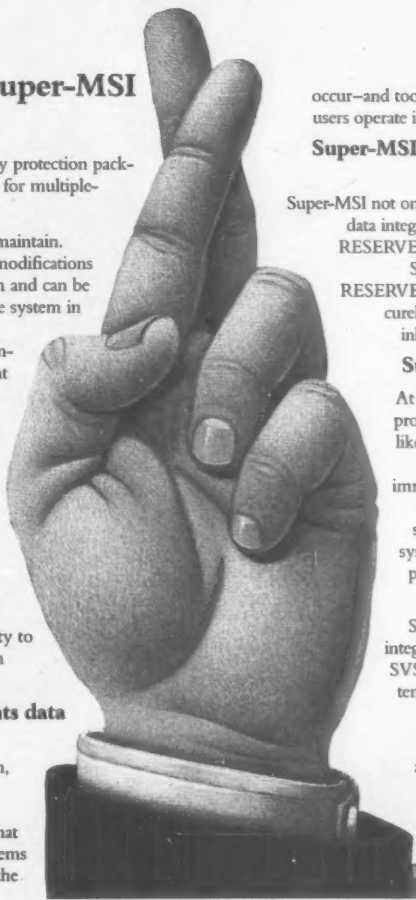
At no extra charge, Super-MSI provides other valuable features like the powerful Dataset Conflict Manager. DCM can immediately identify the source of dataset conflicts—within a single system or across inter-system activity—and inform all parties to expedite the resolution of conflicts.

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editing of IDMS-DC means programmers no longer have to write code to define their screen layouts or to validate and edit input data. ADS/OnLine leads application developers and end users through every step necessary to generate IDMS applications. Users merely define in English-like terms the process they want to accomplish, and ADS/OnLine does the rest.



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'Lawtime II' Receives Retrieval, Report Generation System

ALTAMONTE SPRINGS, Fla. — Systems & Software Associates, Inc. has announced an information retrieval and report generation system designed to complement its Lawtime II legal software package.

Lawscan, said to require no programmer translations, reportedly allows Lawtime II users to select information contained in the Lawtime II master or data files; compare the selected information; compute new information by adding, subtracting, totaling or averaging; and print or display the information with automatic page numbering, page formatting and

titles.

Lawtime II and Lawscan operate on most Datapoint Corp. hard-disk computer systems and are compatible with Datapoint's operating systems and Datashare.

Lawscan costs \$3,250. Lawtime II — consisting of time accounting, client cost advances, billing, cash receipting and accounts receivable, general ledger, trust accounting and escrow accounting — ranges from \$15,000 to \$40,000, depending on the size of the law firm.

Systems & Software Associates is located at 307 Whooping Loop, Altamonte Springs, Fla. 32701.

Gentry Unveils Version Of REX/3000 Language

OAKLAND, Calif. — Gentry, Inc. here has announced a new version of its REX/3000 development language that it describes as a blend of the features of Pascal and Cobol with report-generating keywords for use on Hewlett-Packard Co.'s HP 3000 systems.

Major features of this release of REX/3000 are multiline detail items in reports and variable information in report subtitles and footnotes, the vendor said. Utility routines for substring manipulation also have been added, Gentry noted.

REX/3000 reportedly includes report- and file-handling primitives that eliminate some of the code

needed with Cobol applications. It can be used with HP's Image data base management system to enable users to create any number of reports, spanning multiple data bases and files with one pass through the file.

REX/3000 is compatible with Gentry's end-user interface, EZV/3000 and Data Dictionary, according to the vendor.

The single CPU license fee for the REX/3000 has been reduced from \$8,500 to \$5,000, effective March 1. The maintenance, enhancement and consulting plan is currently \$1,000 annually. EZV/3000 is included at no charge for purchasers of REX/3000 and may be purchased separately for \$850, with an annual maintenance fee of \$100.

Gentry is located at 430 40th St., Oakland, Calif. 94609.

Marketing Tool Out for Lease

EAST LANSING, Mich. — Standard Research, Inc. has announced that RPX TAB, a market survey analysis tool, is now available for site lease or time-sharing access on Prime Computer, Inc.

RPX TAB system contains features designed for the market research professional, the vendor said. Data access and report generation are based on Query language-type statements.

The software reportedly generates cross-tabulations, frequencies, case-by-case listings and basic descriptive statistics. Histograms, bar charts and other features assist in producing publication-ready survey reports, the vendor said.

RPX TAB is available for single-site lease or through time-sharing access from Standard Research, P.O. 151, East Lansing, Mich. 48823.

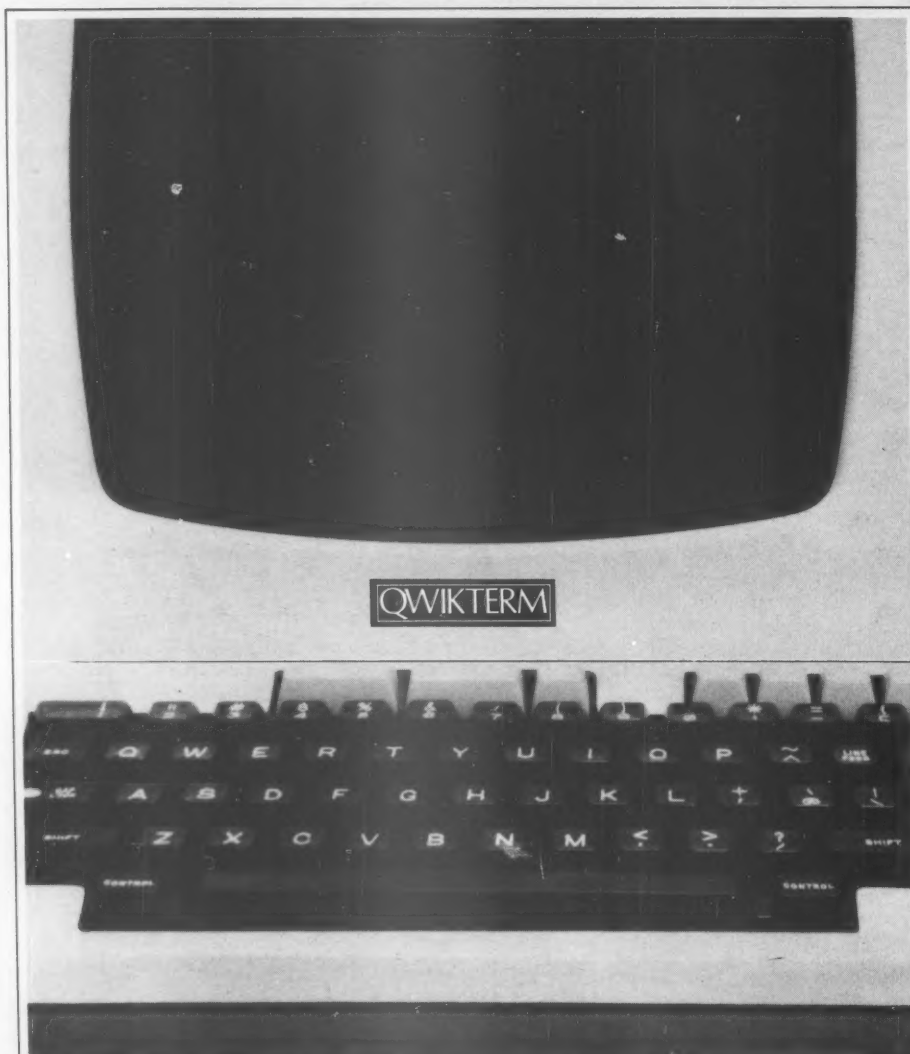
Software Backs Beverage Sellers

POMONA, Calif. — General Business Computer Applications, Inc. has introduced its Wholesale Beverage System for the IBM System/23 Data-master.

The system, according to the vendor, includes preprinted driver-sale invoices, driver-sale invoice entry, presale order blanks and/or labels, presale order entry, presale invoices and loadsheets, route reconciliation (on-line driver check-in), inventory accounting, accounts receivable and sales analysis.

The system handles both presale and driver sale operations, supports both cash and charge states, maintains a two-year sales history, supports multiple territories and brands, accommodates both 3.2% and 5% licenses and produces sales and distribution information, according to the vendor.

The system is priced at \$6,775, including installation assistance. The vendor is located at 2001 N. Garey Ave., Pomona, Calif. 91767.



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Industry Growing, Salaries Rising Shortage of Skilled Personnel Predicted

By Jim Bartimo
CW Staff

NEW YORK — There will be a shortage of skilled manpower in the telecommunications field in the coming two decades, according to the "Thirteenth Annual Telecommunications Salary Survey" released recently by Personnel Resources International, Inc.

Although the field experienced slow growth and some layoffs in 1981, the study said, the industry will grow quickly and salaries will increase as manpower becomes scarcer. A data processing operations manager in the field can expect to earn between \$26,400 and \$31,700 this year, the study said, while communications and consulting managers can expect to earn between \$32,400 and \$45,200.

Last year's slump was attributed to high interest rates, inflation and recession. The scarcity of money made it difficult for companies to expand their staffs and for employees to relocate to expensive homes, Personnel Resources noted.

By Geographic Area

The leading geographic regions of growth in the field have recently been the Southwest, followed by the Southeast, the West Coast and the Northeast. The Midwest has remained stable.

Two examples of rapidly growing areas for telecommunications jobs, San Francisco and Washington, D.C., were especially hard hit in the housing crunch, so superior positions often went to those who could easily relocate. "We have seen a number of situations in which employers have made job offers to local candidates when out-of-town job seekers had clearly better qualifications," Jay Jacobson, president of Personnel Resources, said.

Areas that continued to require personnel are telephone companies, satellite and

THIRTEENTH ANNUAL TELECOMMUNICATIONS SALARY SURVEY

REAL-TIME DP SYSTEMS

Category	Salary U.S.	Salary N.Y. Area
Programmer/Message Switching	\$21,100-25,900	\$23,000-28,100
Senior Programmer/Systems (Telecommunications)	\$24,300-28,700	\$26,300-32,100
DP Operations Manager	\$26,400-31,700	\$29,800-34,200
Systems Executive ¹	\$32,800-43,200	\$36,500-46,800

COMMUNICATIONS MANAGERS/CONSULTANTS

Category	Salary U.S.	Salary N.Y. Area
General Consultant/Analyst	\$22,900-33,700	\$25,200-35,400
Communications and Consulting Director	\$32,400-45,200	\$36,300-50,400

¹ Los Angeles, San Francisco, Chicago and Boston areas are above "Elsewhere ranges" and below N.Y. ranges.

Source: Personnel Resources International

Salaries are expected to grow as job openings increase.

other common carriers, telephone interconnection firms, two-way radio firms and radio common carriers and large users such as banks, insurance companies, natural resource firms and manufacturers, the study said.

Those large users needed communications managers and analysts in the telephone, data communications and radio functions. At least one college degree is required for these jobs, and technical or advanced degrees are frequently preferred, according to the study.

These users wanted people with experience in advanced systems and techniques such as networking, office-of-the-future, state-of-the-art computer telephone switching, microprocessors, packet-switching, fiber optics, satellite transmission and system network architecture.

Satellite and other common carriers con-

tinued growing and required new employees in marketing, engineering, installations and maintenance. They sought people skilled in all types of transmission systems, satellite technology, electronic switching, network planning and sales, the study said.

Telephone interconnection firms of all sizes had openings for installation and sales personnel as well as marketing and installation managers. Their applications and systems personnel were a critical link between their marketing and installation departments.

But large manufacturers of switching and transmission equipment had very few openings last year. The smaller competitors (some foreign companies among them) seemed to be growing at a faster rate in terms of hiring.

Extreme shortages in skilled workers were seen among circuit design engineers, telecommunications software people, data and radio technicians, network analysts and technical writers.

Reasons for Shortage

The study cited the following factors explaining the need for telecommunications manpower in the coming years:

- Technological developments. Products in the industry are in their formative stages. Electronic mail, advanced network and switching techniques, satellite transmission for commercial and consumer applications and other office-of-the-future concepts will create a need for manpower

(Continued on Page 40)

DCA Switching Device Handles Large Number of Terminals

NORCROSS, Ga. — Digital Communications Associates, Inc. (DCA) has unveiled a data communications switching device designed to automatically connect a large number of remote and local terminal users to their choice of one or more groups of ports on one or more computers. Users contend for host ports on a first-come,

first-served basis.

The Netswitch also allows the attachment of multiplexing equipment. Any DCA statistical multiplexer or network processor may be accommodated, a DCA spokesman said.

The Netswitch can directly drive a DCA System 115 or System 105 statistical multiplexer, providing up to 32 remote ports. It can also directly drive a System 205 Unibus interface to Digital Equipment Corp. computers with a Unibus.

The switch can support up to 1,376 local and multiplexed remote ports, DCA said. The number of local ports ranges from 32 to 1,120.

The maximum number of optional multiplexed link connections ranges from two trunks on a 32-port Netswitch to eight trunks on a 1,120-port model. Each trunk link is capable of supporting 32 ports. Ports on the device can operate up to 9,600 bit/sec. Trunk speeds are also 9,600 bit/sec.

From the operator's CRT terminal, the operator may change port parameters and routing for both local and multiplexed remote ports, get reports on traffic levels and switch operation and test both local and multiplexed remote ports.

The Netswitch costs \$11,595. DCA is located at 303 Technology Park, Atlanta, Ga. 30092.

Have a Tale Of Terminals?

A Special Report on data communications terminals is coming up, and *Computerworld* wants your help.

We are looking for user and vendor commentary on the way terminals are making computers more responsive to users' needs.

Possible topics? We're open to suggestions. Tutorials, application stories and industry commentaries are good ideas.

Feb. 20 is the deadline for submissions, which should come in the form of four to seven typed, double-spaced pages. Send your stories to Bruce Hoard, *Computerworld* Editorial Department, P.O. Box 880, Framingham, Mass. 01701.

CRT Terminal Fits System/34, 38

CUPERTINO, Calif. — Memorex Corp. has introduced a CRT terminal that communicates with the IBM System/34 and System/38.

The 2051 Model 11 display station has a separate keyboard and belongs to the Memorex cluster of small systems terminal products, including the 2056 and 3056 matrix printers.

The 2051 can attach directly to the host computer and has a screen capacity of 1,920 char. consisting of 24 80-char. lines. The monitor tilts and has a recessed, non-glare screen, the vendor said.

The unit costs \$2,850 from Memorex Corp., San Tomas at Central Expwy. Santa Clara, Calif. 95052.

COMMUNICATIONS

Telex Tabletop Printer Compatible With IBM 3270

TULSA, Okla. — An IBM 3270 plug-compatible tabletop bidirectional printer with high-speed hard-copy output of up to 150 char./sec is available from Telex Computer Corp.

The Telex Model 287D attaches to either Telex's 276 Control Unit or IBM's 3274/3276 cluster controller as well as to the IBM 4331/4341 processors and IBM's 3601 finance communications controller.

A choice of Ascii-B or Ebcidic character sets is offered. Alphabetic characters are selectable in uppercase/lowercase or uppercase only. The printer costs \$5,150, Telex said from 6422 E. 41st St., Tulsa, Okla. 74135.

For TNS Applications

DMS Unveils Modem Eliminator

NORWALK, Conn. — Datacomm Management Sciences, Inc. has unveiled a device that allows interconnection of data terminal equipment without the need for modems in applications such as IBM's Teleprocessing Network Simulation program.

The ME-31 Modem Eliminator regenerates data and clock interface signals so that

a full 50-ft interface cable may be used at each RS-232 terminal interface, the vendor said. The unit supplies Data Set Ready to both terminal devices and presents Carrier Detect to either terminal when the other terminal's request-to-send is activated.

In synchronous applications, the ME-31 generates send and receive clock signals used by both terminals.

The signals are derived from an internal crystal generator or optionally from a clock produced in either terminal unit, the vendor said.

The unit costs \$315 from Datacomm, at 25 Van Zant St., E. Norwalk, Conn. 06855.

Rugged Unit Gives Color

ETTERS, Pa. — A color CRT terminal designed for rugged commercial and industrial applications is available from HMW Enterprises, Inc.

The Model 9701 features independent monitor and display generator power supplies and a detachable solid-state keyboard. The display format is 80 char./line, 48 line/page. Editing features include dual cursors, horizontal and vertical writing modes, tabulator, roll and scroll, the firm said.

The color CRT terminal costs \$3,995 from HMW at 604 Salem Road, Etters, Pa. 17319.

Survey Sees Staff Lack

(Continued from Page 39)
as they enter the market.

- Deregulation. Heightened competition will result from deregulation. "AT&T's new \$15 billion subsidiary will operate in the new deregulated sector and its competitors will have to be staffed," Jacobson said.

- Defense spending. The federal administration's plan for an \$18 billion defense communications program will keep thousands of engineers, systems planners, technicians and support personnel busy for many years, Jacobson said.

- Engineer shortage. Many new electronics engineering graduates are attracted to energy, computers, consumer products, instrumentation and other segments, the study said. Telecommunications will have to fight hard in the "talent crunch."

A free copy of the survey is available from Personnel Resources, Suite 937, 342 Madison Ave., New York, N.Y. 10173.

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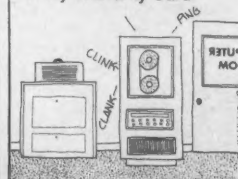
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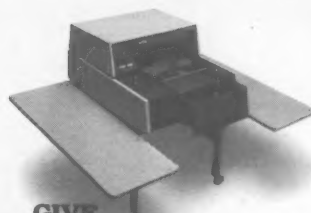
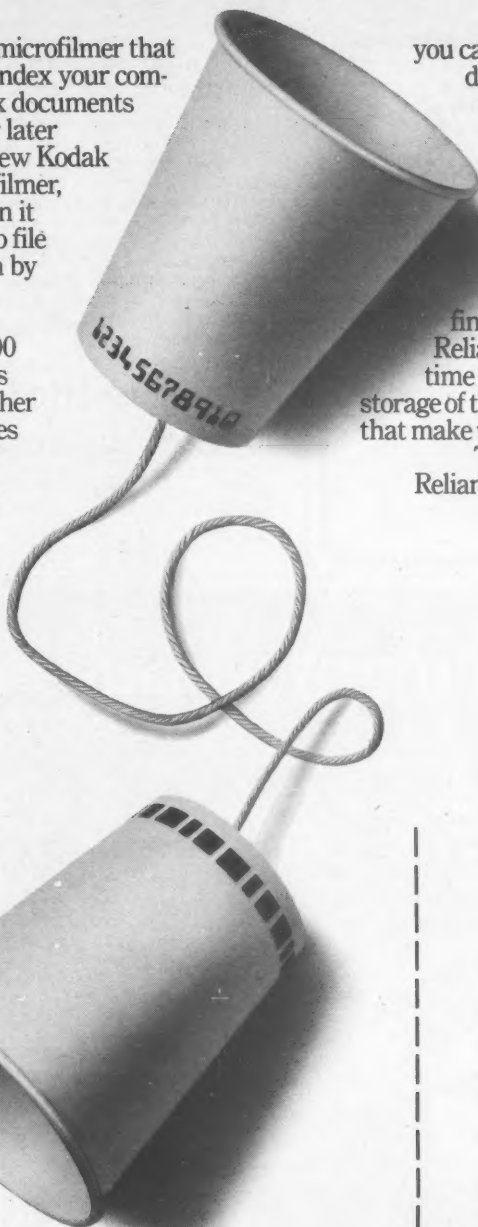
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Storage Tool Offers Access to TWX, DDD Nets Up to 1,200 Bit/Sec

IRVING, Texas — Envax Corp. has announced its Model 512, a communicating storage device that offers access to TWX and Direct Distance Dialing (DDD) networks at transmission speeds up to and including 1,200 bit/sec.

The Envax 512 includes an internal 212A Bell-compatible modem and all standard Envax features, including operator prompting, automatic transmission, text editing and battery-pro-

tected send/receive memory.

The device helps reduce connect time charges by setting up transmission at 1,200 bit/sec after hours when evening long-distance rates are in effect, the firm said.

The 16K-byte version of the Model 512 sells for \$1,950 and the 48K-byte unit sells for \$2,505, according to the firm.

Envax is located at 1401 Walnut Hill Lane, Irving, Texas 75062.

Emulex Adds Multiplexer, Cuts Prices

SANTA ANA, Calif. — Emulex Corp. has introduced the third member of its CS21 family of communications multiplexers and announced price reductions on both the CS11 and CS21 multiplexer families.

The Model CS21/Z emulates the Digital Equipment Corp. DZ11E 16-channel asynchronous multiplexer. It provides the capability to connect up to 16 asynchronous RS-232 communications lines to any PDP-11 or VAX-11 computer using one slot in the Unibus backplane, according to the vendor.

Its standard features include double depth, 128 char./8 line, receive Fifo buffering and modem control. It lists for \$3,500 for a 16-channel system.

The DH11 compatible versions of its CS11 and CS21 series communications products have been reduced in price. The price of CS21/H has been reduced from \$4,100 to \$3,500 and for the CS11/U from \$6,250 to \$4,950.

Emulex is at 2001 E. Deere Ave., Santa Ana, Calif. 92705.

Terminal Offers Full Editing, Protected Fields

ANAHEIM, Calif. — Jonos Ltd. has announced the 100 Series terminal that employs microtechnology including full editing features, protected fields and a nonglare sculptured keyboard. The 101 Series terminal has identical features but offers a detached keyboard.

The 100 Series features 24 lines of 80 char. A 25th status line affords a total of 2,000 displayable positions, each of which can display one of two switch or software selectable char. sets, the vendor said.

Other features include full cursor control, function keys, block mode transmission, full-duplex or half-duplex communications and a local or monitor mode. The terminal has debugging activities that include a Datascope mode permitting the operator to see control codes within the data stream, the vendor said.

The 100 Series terminal costs \$500 and the 101 costs \$575, Jonos said from 920-C E. Orangethorpe, Anaheim, Calif. 92801.

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Video Cassette Course Teaches Communications to DP Managers

ATLANTA — "Telecommunications and the Computer" is a series of video cassettes now available for rental or purchase from the Associa-

tion for Media-Based Continuing Education for Engineers, Inc. (Amcee). The course is aimed at managers responsible for planning or implementing interactive computer systems involving the use of telecommunications.

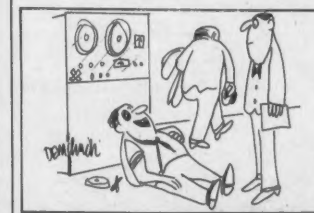
Dr. Ira W. Cotton, who teaches the same course at George Washington University, Washington, D.C., covers terminal interfaces, multiplexing, switching techniques, error control, computer networks, data base distribution systems, security in data communications and the management of computer networks. The series is composed of 12 video sessions.

The rental fee for the series is \$900; the purchase price is \$3,600. A preview package that contains samples from all the tapes and includes other material costs \$125 to rent.

More information is available from Laura Rob, Amcee, Department 95, 225 North Ave., N.W., Atlanta, Ga. 30332.

Correction

"Workstations Introduced for Ethernet" [CW, Dec. 14] should have noted that the 10M-Bit Ethernet option for Three Rivers Computer Corp.'s Perq single-user workstation costs \$3,600. Perq itself costs \$27,000.



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(GTC is currently seeking Independent Sales Organizations. Inquiries welcomed.)



*Registered trade mark of Digital Equipment Corporation

Tester Line Gets Addition

ALEXANDRIA, Va. — Atlantic Research Corp. has announced an addition to its Interview family of data communications test equipment. The Interview 29A, 30A and 40A Series Data Analyzers are suited for field service, technical control and starter applications.

Based on the Interview 3500 and 4500 Series Data Analyzers, the new series offers 512 char. of data and protocol sequences from an 8K buffer. The user can add up to 50 tests of his own design and the programmer is built-in for storing and duplicating tests for field distribution, the vendor said.

The base prices are: Interview 29A, \$2,995; Interview 30A, \$3,200; Interview 40A, \$3,750.

Options allow the user to start with the basic 29A or 30A and later upgrade to the 40A. More information can be obtained from Atlantic Research, 5290 Cherokee Ave., Alexandria, Va. 22314.

Polling System Allows Multidrop Configurations

SIMI VALLEY, Calif. — A polling system designed to allow multidrop configurations in remote locations using existing host CPU software and dumb Ascii terminals has been announced by Teleprocessing Products, Inc.

The Teleprocessing Products Polling System is made up of three elements: the TP-400 Polling Controller for the central site, the TP-200M and/or TP-212 (both with

polling options) for remote locations.

The TP-400 reportedly can support up to 32 I/O channels with an expansion module, and has buffer memory of 16K bytes, or optionally 32K bytes. A typical network can be installed for an average cost of \$1,000 to \$1,200/drop, including central site hardware, a spokesman said from 4565 E. Industrial St., Building 7K, Simi Valley, Calif. 93063.

Source Data Entry Users Get Pocket-Size Terminal

COSTA MESA, Calif. — A pocket-size computer terminal has been introduced by MSI Data Corp. for source data entry applications by sales, distribution and inventory staff.

Information entered by the operator on the MSI/55's keyboard is collected in the terminal's memory and can

then be transmitted over telephone lines to a central computer for processing, the vendor said. The terminal also has a four-function calculator and a 12-char. liquid-crystal display.

Weighing about six ounces, the MSI/55 is controlled by a microprocessor. It also has a communications coupler, the vendor said.

Produced in Japan for MSI by Matsushita Communications Industrial Ltd., the terminal is available in two models. One collects and stores up to 4K char. of data in a random-access memory and the other has a 2K-char. memory with a separate read-only memory providing 4K bytes of storage.

The terminal is sold to end users in minimum quantities of 100 for between \$220 and \$255 each from MSI, 340 Fischer Ave., Costa Mesa, Calif. 92626.

Switchers Out for IBM, Wang, HP, DEC

PALO ALTO, Calif. — Gilttronix, Inc. has unveiled a family of terminal switchers compatible with Wang Laboratories, Inc., Hewlett-Packard Co., IBM and Digital Equipment Corp. equipment.

The GBNC-S8ABC will switch one terminal between three or more CPUs or modems. The unit has four BNC-type connectors on the rear panel. One connector is dedicated to the terminal and the other three can be connected via coaxial cables to three CPUs or modems.

The other unit in this family is the GBNC-S8AB. It is similar to the GBNC-S8ABC, but connects one terminal to two CPUs or modems. The front panel has one two-position knob, and the rear panel has three BNC connectors. The GBNC-S8ABC costs \$159 and the GBNC-S8AB costs \$139, Gilttronix said from 450 San Antonio Ave., Palo Alto, Calif. 94306.

Impact Printers Announced Compatible With 3287

DALLAS — Carterfone Communications Corp. has announced two dot matrix impact printers for the firm's Model 7276 control unit display station.

The bidirectional Models 5082 and 5083 print at 120 char./sec and are said to be compatible with the IBM 3287 printer. At 10 char./in., the 5082 prints an 80-char. line and the 5083 prints a 136-char. line.

Both units have a 9 by 9 dot matrix print head and feature both friction feed and a forms tractor.

The 5082 costs \$750; the 5083 costs \$1,150. A two-year installment/sale agreement costs \$36/mo for the 5082 and \$55/mo for the 5083. A service agreement costs \$25/mo for the 5082 and \$35/mo for the 5083.

The firm is located at Suite 1400, 1111 W. Mockingbird Lane, Dallas, Texas 75247.

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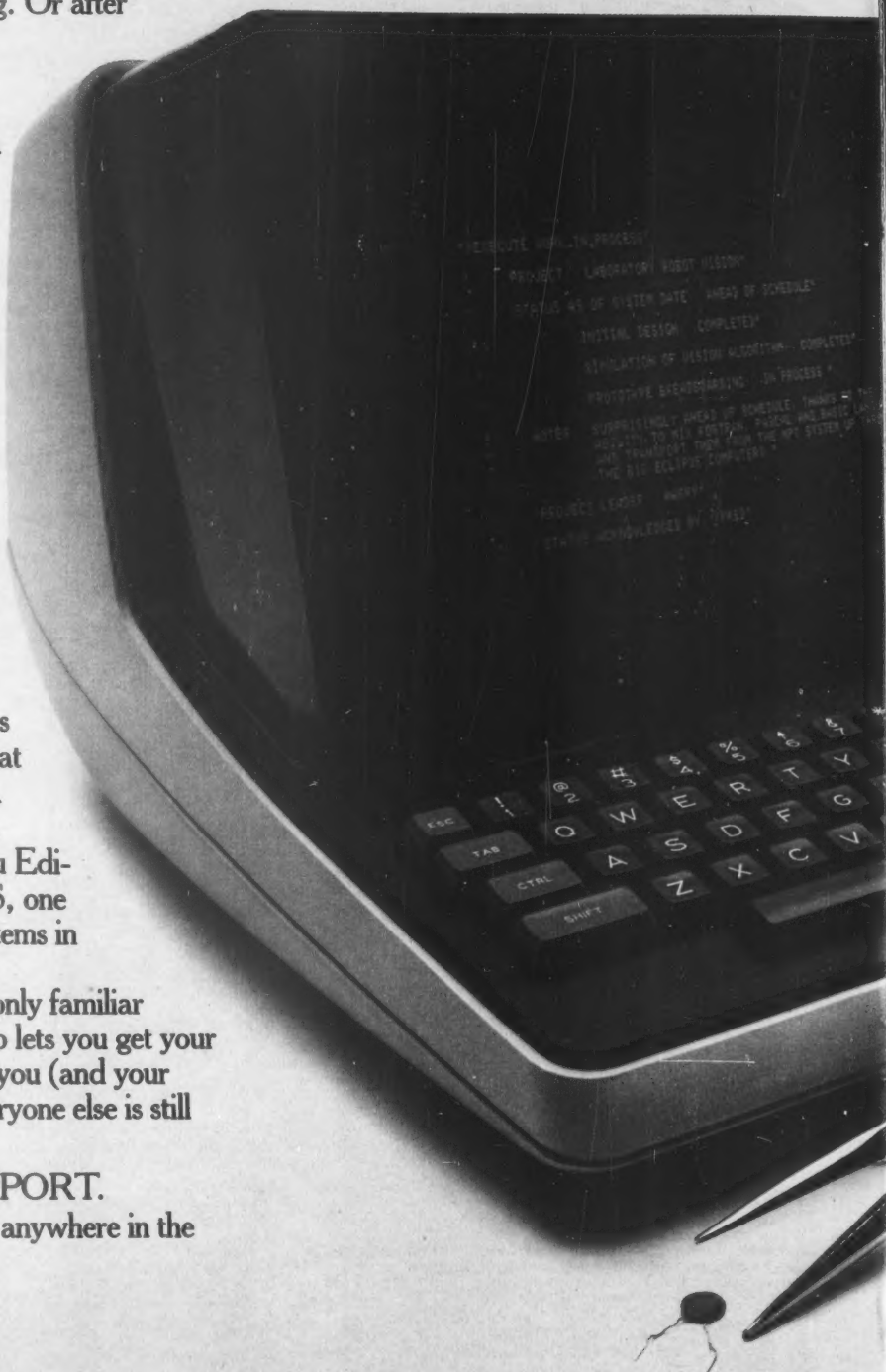
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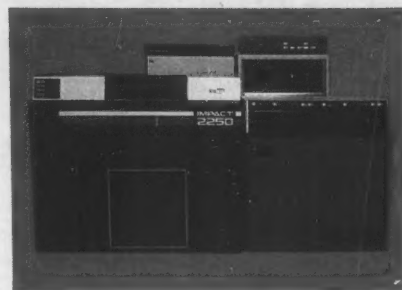
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Expanded Version of Prism Line Available

MILFORD, N.H. — Integral Data Systems, Inc. has announced an expanded version of its Prism line of printers. The line is a modular, field-upgradable printer that can use add-on options to adapt the unit to a variety of applications.

The units are available only through authorized dealers, who will install the various options. A basic unit, which costs about \$899, includes propor-

tional spacing, bold text printing and standard print densities.

Options include an automatic cut sheet feeder for handling letterhead-size paper, the firm's Dot Plot graphics package, a sprint mode for high-speed output and a color package.

The color package costs \$300 and the sprint package costs \$297, the vendor said from Milford, N.H. 03055.

Decoder Module Interfaces With HP Wands

PALO ALTO, Calif. — Hewlett-Packard Co. has announced an integrated bar code decoder module that interfaces with HP's digital bar code wands.

The Heds-0100 decodes the third bar of a nine bar code and transmits data over a parallel

Ascii RS-232C port. The unit can operate as a slave microprocessor-unit board or as the heart of a transmit-only terminal.

It costs \$490, the vendor said from the Inquiries Manager's Office, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Wand/Scanner Links With Host, Peripheral

WESTLAKE, Ohio — Datalogic Optic Electronics, Inc. has announced the Model DP100, an on-line wand or fixed-beam scanner.

The unit can simultaneously be interfaced with a host processor and peripheral device through a dual on-line output

connector. The device operates on 110/220 V and has a scan speed of 3 to 30 in./sec with a transmission rate from 110 to 9,600 bit/sec, the vendor said.

The DP100 costs \$1,045, the vendor said from 2904 Southwood Drive, Westlake, Ohio 44145.

Gould Adds AC Power Line Conditioners

SAN DIEGO — Gould, Inc.'s Electronic Power Conversion Division (GPC) has introduced a line of ac power line conditioners that reportedly protect computer and word processing systems from spikes, brownouts and other problems.

The GPC 560 conditioners are available in a power rating of 500VA and packaged in a style suitable for an office environment.

The units cost \$475 each from the firm at 2727 Kurtz St., San Diego, Calif. 92110.

Tape Cleaning System Out for High-Speed Drives

WALTHAM, Mass. — Dennison Kybe Corp. has announced a tape cleaning system for high-speed, high-density drives.

The MLC-300 series unit re-tensions and restacks a 2,400-ft reel of tape in 3.3 minutes. It also checks for missing or dou-

ble beginning of tape markers and can optionally remove a static charge to keep tapes clean longer. The unit can also be field-upgraded to detect tape defects, the vendor said.

The unit costs \$3,695, the vendor said from 82 Calvary St., Waltham, Mass. 02254.

Uninterruptible Power Source Introduced

DANVILLE, Calif. — An uninterruptible power source is available from General Interface Systems, Inc.

The unit is said to provide at least 15 minutes of operating

power at up to 5A in the case of a total prolonged power failure.

The unit costs \$995 from the firm at Suite 358, Hartz Plaza, 560 Hartz Ave., Danville, Calif. 94526.

Color CAD System Aids Design of VLSI Circuits

SCOTTS VALLEY, Calif. — Avera Corp. has announced a color computer-aided design system for very large-scale integration (VLSI) circuit development.

The GS1220 is a color version of the firm's Avera stand-alone desktop unit. It can be used as an interactive workstation for electronic drafting and schematic capture. It comes with a graphics editor and a flexible data structure.

The GS1220 uses eight basic

colors and combines colors to provide a total of 256 shades, the vendor said.

The system, based on two 16-bit microprocessors, comes with a 512K-byte diskette drive and a 10M-byte Winchester disk drive. It includes two RS-232 interfaces as well as the necessary disk, keyboard and cursor control, the vendor said.

The system costs \$55,250 from the vendor, 200 Technology Circle, Scotts Valley, Calif. 95066.

STC Disk Controller Performs Like Cache, Cuts Response Time

LOUISVILLE, Colo. — Storage Technology Corp. (STC) has introduced an intelligent disk controller that performs like a cache memory and is said to reduce sequential I/O response times by 40% to 75% over industry-standard direct-access controllers.

The Model 8890 Sybercache features two storage directors that handle host channel-to-subsystem communications and up to 12M bytes of buffer memory.

Performing as an intelligent cache, the controller directs data flow and manages disk subsystem resources, resulting in faster access by the host computer, a spokesman noted.

Sybercache can work with STC's 8350, 8650, 8360 and recently debuted 8380 disk drives. It is fully compatible with IBM 4341, 370/135 through 370/168, 30 series, 3081 or equivalent computers, he added.

The 8890 controller has a built-in microprocessor that evaluates host channel programs, then directs data flow according to the performance needs of each data set.

The controller's processor determines which operations

should be directed to disk, which to cache and how much buffer space is required by each program, according to the spokesman.

For example, when sequential data is presented to the controller, it is usually directed via the system's cache. Since host channels communicate with high-speed semiconductor memory — and are not constrained by disk rotation, recording density or blocking — transfers occur at full channel speed.

Head seek time, rotational delay and path reconnect are virtually invisible to the host CPU, according to the spokesman, since the STC device stages data ahead of each operation. However, when confronted with random-access operations, the device directs them directly to disk, bypassing the cache, for cost-performance reasons, he added.

The STC device is faster than conventional controllers, the spokesman claimed, because industry-standard direct-access units reportedly have limited pathing options and configurations adapted for batch-oriented systems.

Standard Features

Standard features of the controller include an on-board management system, 1.5M bytes of buffer memory (optionally expandable to 3M-, 6M- or a maximum 12M bytes), a two-channel switch and a maintenance processor. Sybercache is also programmed to detect multiblock and multitrack operations.

The controller reportedly supports all IBM OS and DOS operating systems with no modifications to programs, catalogs or Job Control Language routines. Purchase prices for Sybercache range from \$161,183 for a basic unit to \$336,323 for a fully configured model. Two-year leases range from \$3,545/mo to \$7,299/mo.

STC is located at 2270 S. 88 St., Louisville, Colo. 80027.

Printer Offers Quad Density

SAN FERNANDO, Calif. — Axiom Corp. has announced the IMP-4, a quad-density printer.

Up to 19,008 individual dots can be printed in a bidirectional mode in a single square inch. Alphanumerics can also be printed bidirectionally in up to six different sizes. The unit features a three-way paper-handling capability that can accommodate single sheets, continuous forms or roll paper.

The IMP-4 costs \$699. Axiom is at 1014 Griswold Ave., San Fernando, Calif. 91340.

Disk for 1100 Built for Fips

CHATSWORTH, Calif. — Amerif Corp. has announced a Winchester-type disk memory subsystem for Sperry Univac 1100 Series processors that reportedly complies with Federal Information Processing Standards (Fips).

Available in two versions, the subsystem supports Fips 60, 61 and 63. The three federal standards specify the hardware interface between host channel and device control processor and the interlocking of power controls of all units attached to a host computer so they can be powered from a single control switch.

The subsystem is designed to be attached to either the word channel of any 1100 Series CPU or the Fips-compliant byte multiplexer channel on newer 1100 models. In its basic configuration, the unit (Model 5046/84502A) contains .5M words of cache memory, a disk controller and a dual-spindle disk drive with a storage capacity of 100.6M word/spindle, the vendor said.

A basic subsystem costs \$258,000, and the word channel version costs \$356,000. Both are available immediately, the vendor said from Suite 420, 1600 Dove St., Newport Beach, Calif. 92660.

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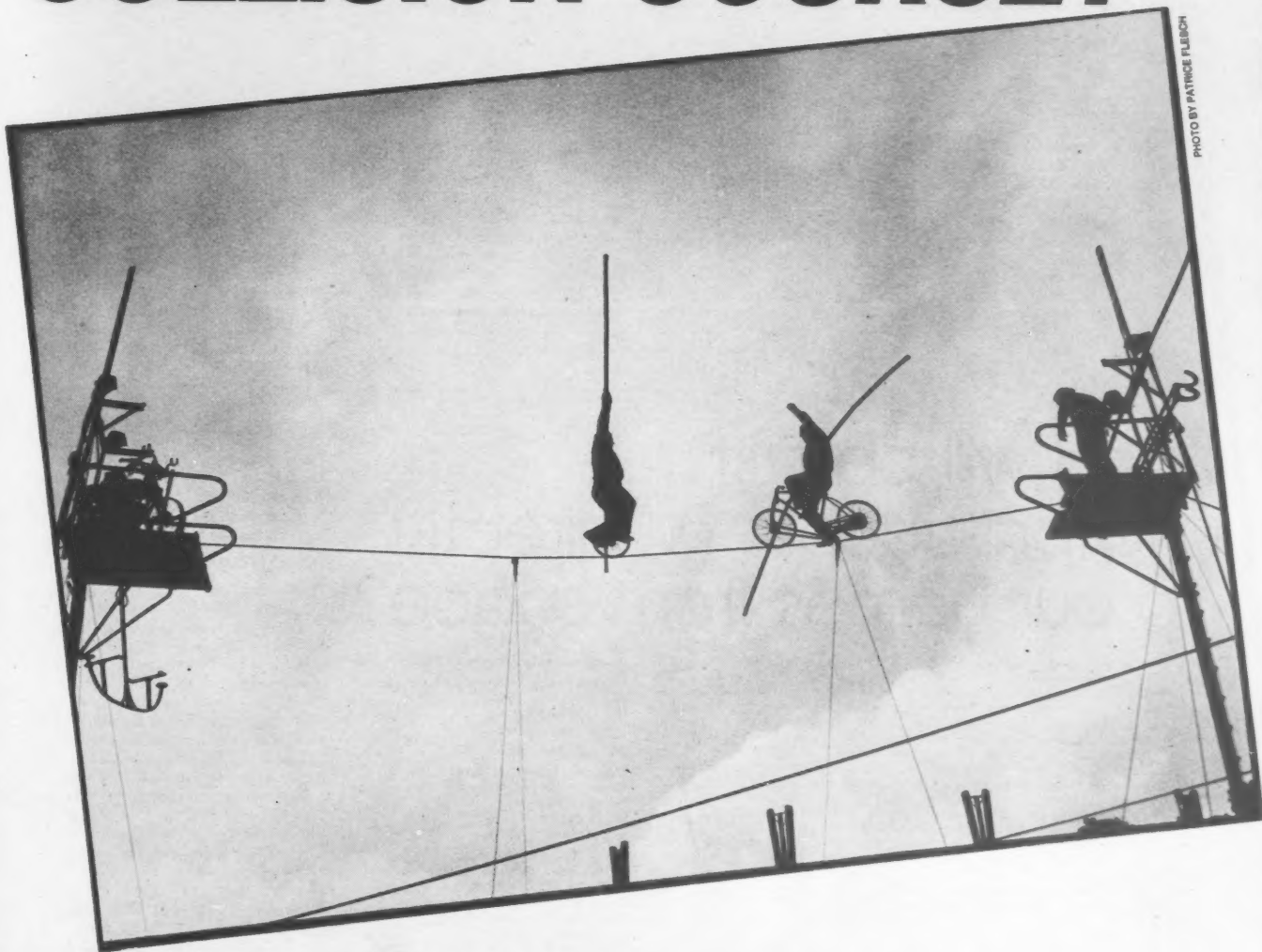


PHOTO BY PATRICE FLEISCH

The Information Center vs. Data Administration ***By Ronald G. Ross***

AS DEFINED BY IBM, THE information center is situated between the DP center and the end-user departments to help the latter groups get the information they need by using high-level languages and software tools that enable them to produce and modify reports themselves.

The information center is typically portrayed as a means to break down DP barriers and allow end users direct access to the corporation's data resources. In contrast, data administration is often viewed as a means of accomplishing more or less the opposite — that is, to centralize and tighten control over the organization and use of corporate data.

Subjectively, then, the question of data administration vs. the informa-

tion center seems almost as simple as controlling or decontrolling corporate data resources. But is this really accurate? Closer inspection of the two concepts leads one to suspect that it is not.

In the first place, comparing data administration and information centers directly is like comparing apples and oranges. More important, the more familiar the two concepts become, the more complementary their respective potentials appear to be.

Therefore, rather than representing a conflict in the making, information centers and data administration may in fact embody mutual keys to improving comprehensive data resource management in the corporation.

To understand these complemen-

tary potentials, the best place to begin is by looking closely at the information center. In simple terms, the idea of an information center requires satisfying the following fundamental issues facing the corporate end user, stated below as the user himself might offer them:

- What problem do I want to solve?

A fundamental difference between the information center approach and typical DP practice is that the former assumes the end user can define his own applications requirement — no systems analyst is required to help the end user rigorously state the "problem" at hand.

Undoubtedly, for a large class of applications in the corporation — especially those concerning mid- and upper level management — this is

IN DEPTH

indeed a valid assumption. The information center assumes the user understands the problem, then exploits his initiative for getting it solved by providing him with the means to discover the solution himself.

• Can I learn to use the computer to solve my problem? The information center accepts what has already been established by time-sharing services and personal computers — many people can in fact learn to employ

user-friendly software tools to solve computing problems. The information center encourages this idea and provides the necessary assistance to see that it happens. Such assistance may take the form of educational classes, one-on-one tutorials, design reviews and advice, customized software services and seeing that the right packaged tools are available.

• Where can I find the data I need to solve my problem? In certain conceptions of the information center,

the user is more or less expected to bring his own data to the party. For certain types of environments — such as scientific and engineering — this may be valid. However, in most commercial situations it is more likely that the user's problem involves data that describes other activities of the corporation — in other words, it already exists in corporate files.

A major responsibility of the information center, then, is connecting end users to these preexisting

sources of data. This may mean providing directories and guides to existing files and data bases; in a more active sense, it may mean actually writing report routines or data transfer programs to let users get at corporate data.

• When I get the data I need, will it have the form and validity I require? This is the major pitfall in the information center approach and is in fact precisely the same pitfall that has plagued forerunner management information systems strategies in corporations for years. Even if the end user states his problem adequately, is able to use computer tools to formulate it and finds the data needed to solve it, there is no guarantee of an acceptable solution unless the data he needs to use is both reliable and adequately organized.

Data Administrator's Role

Meeting that objective is precisely the role of the data administrator. He can be seen working toward that goal at each of three essential levels:

• Data dictionary control. The first and foremost tool of the data administrator is the data dictionary system, which is primarily used to document all data bases, files, programs and systems so that an authentic and reliable blueprint of the corporation's data resource systems exists at any given point in time. The cross-reference and impact assessment facilities of the data dictionary are used to ensure that system changes are accurately implemented. This, in turn, directly enhances the reliability and quality of the underlying data.

• Standardization. A second major activity of the data administrator is standardizing data element definitions, data coding schemes, reporting and comparison methods and other components that lie at the very heart of the corporate data quality issue. The goal here is to improve the consistency and overall reliability of data in different corporate areas.

• Logical data base design. A third and crucial data administrator responsibility is the planning and conceptual design of the corporation's data resources. The primary objective in this design is to locate data redundancy across different areas of the corporation and to ensure that the physical data base designs implemented by the data base administrator achieve both shareability and true data integration. In effect, this means exploiting data base management systems to their fullest in achieving unified and dependable (as well as properly structured) data resources.

In a very fundamental sense, the answer to any question is only as good as the data upon which it is based. The arguments above should make it clear that data administration is the cornerstone in building an information center that is not inherently self-limiting from the very beginning.

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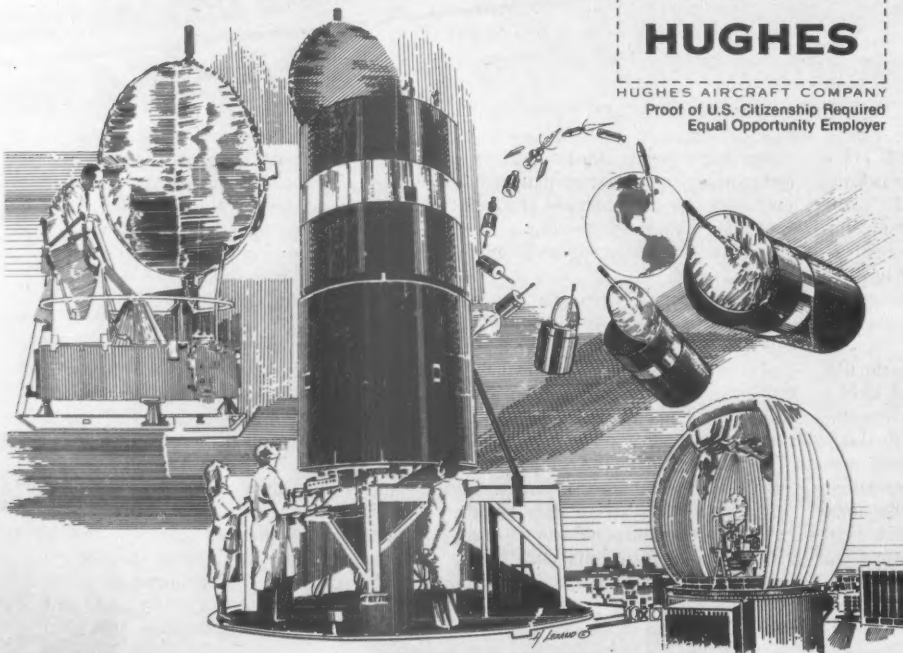
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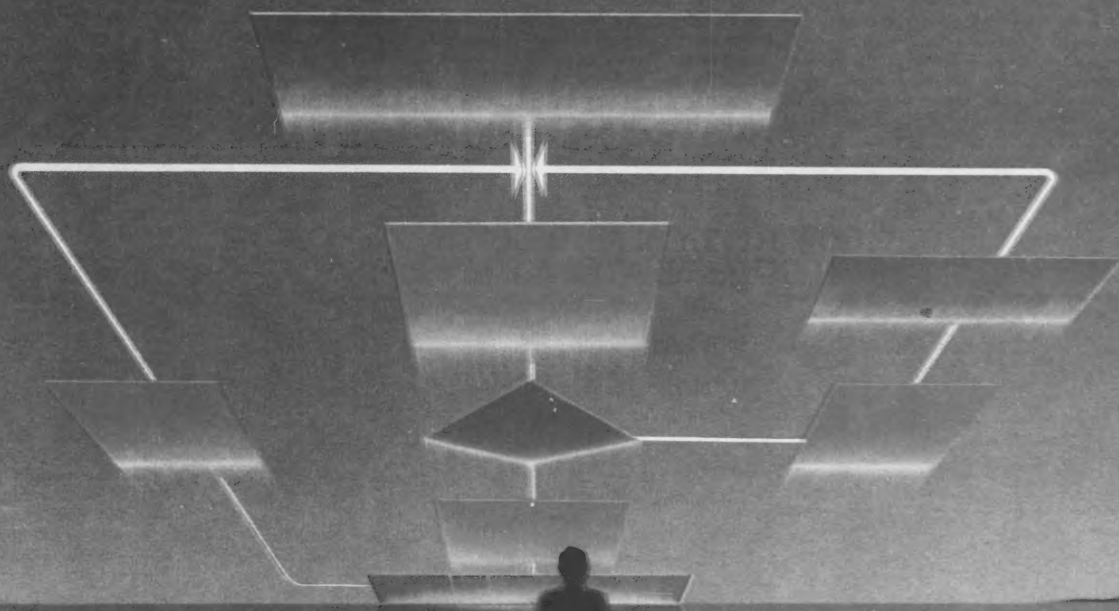
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planning for data administration is absolutely essential in creating an effective information center. But now turn the question around: What does the information center offer data administration?

First, the data administrator is already busy creating an information directory for the corporation as needed by the information center. This is one important aspect of his efforts with the data dictionary.

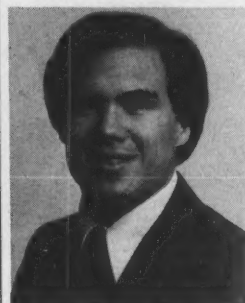
Second, typical thinking about the corporate placement of the data administrator puts him outside the DP department, reporting directly to corporate management. This placement gives him political clout in dealing with the DP staff and puts him more in tune with end-user and management needs and objectives. The information center may be just the

device he needs to achieve this end-user orientation for computing in the corporation and, in the process, to give the DP department some much needed breathing room to accomplish its own crucial mission.

Finally, many formulations of the data administrator see him as a key player in long-range systems planning, as well as in the coordination of ongoing user requests for services. The sponsorship of an information center may provide the eye-opener he needs for discovering what is often called the "hidden backlog" of corporate applications — a crucial step for adequately planning the computing future of the corporation.

The bottom line in these observations is that it is simply wrong to believe that data administration and information centers are plunging along on an ultimate collision course in the corporation. With proper planning and commitment, each may provide a significant measure of the techniques and ideas needed to achieve the worthwhile goals of the other.

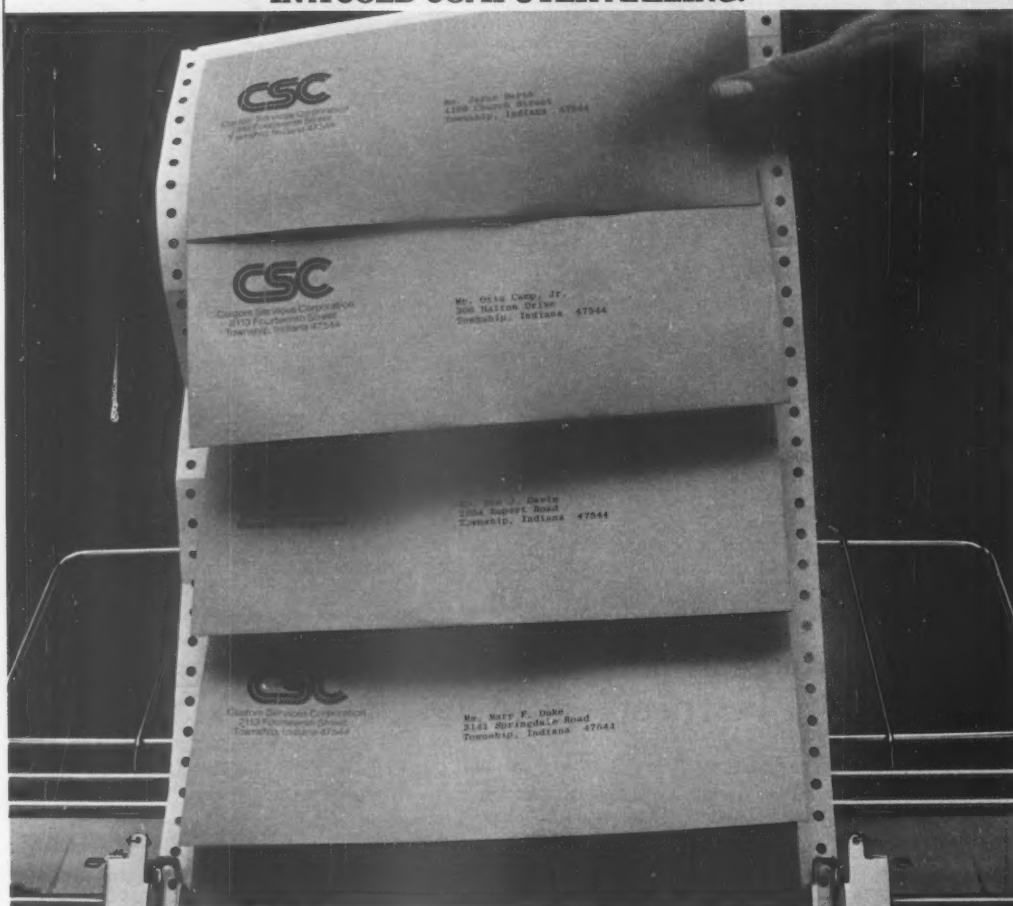
About the Author



Ronald G. Ross is senior staff consultant with Performance Development Corp. (PDC) of Princeton, N.J., and is editor of its bimonthly publication "Data Base Newsletter."

Ross is the author of a number of professional publications, including *Data Base Systems: Design, Implementation and Management* (Amacom, 1978), *IMS Concepts* (PDC, 1979) and *Data Dictionaries and Data Administration: Concepts and Practices for Data Resources Management* (Amacom, 1981).

His involvement with research and development for distributed data processing spans more than five years. He holds a B.A. from Rice University and an M.S. from the Illinois Institute of Technology.

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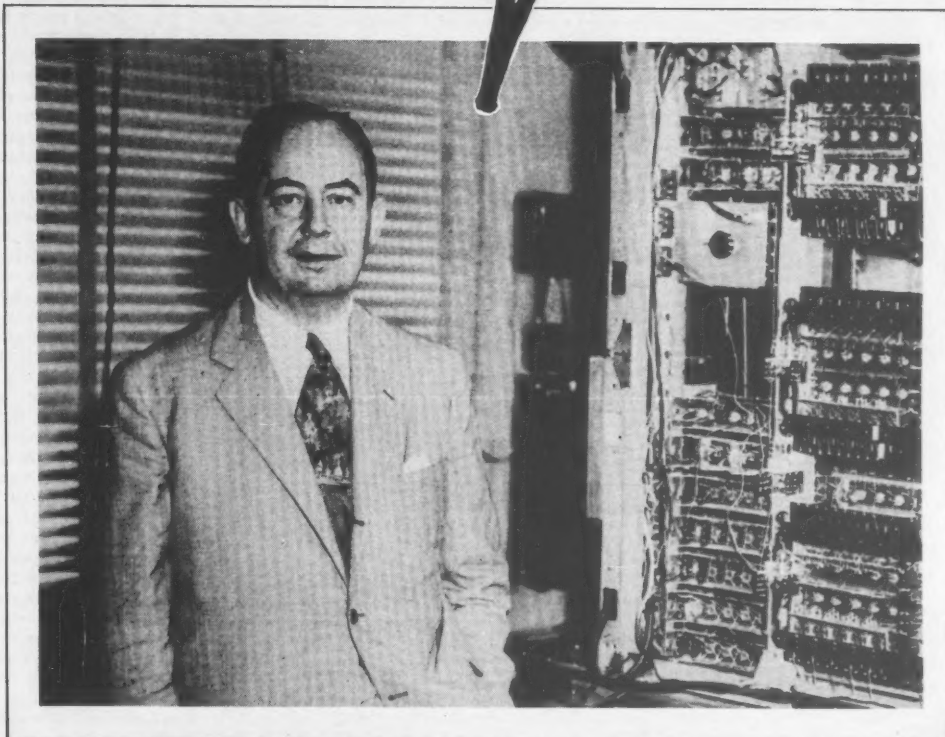


PHOTO BY ALAN W. RICHARDS

Mathematician, Innovator, Computing Pioneer

JOHN VON NEUMANN WAS ONE of the most influential mathematicians and computing pioneers of this century. Among his technical contributions, he helped to formalize the logical design features of the Edvac, the world's first electronic digital computer designed to incorporate stored-program capability.

But there was another dimension to von Neumann's influence, one that was at least as important as the technical side. He was able to bring together various groups of people capable of contributing to computer development and groups who could benefit from it.

Von Neumann's ability to legitimize the computer as a scientific tool to be used by aca-

demics was as significant as his specific contributions to the computing field. Moreover, his efforts to disseminate information on computer development contributed to the transfer of technology to other spheres, as well as to the widespread applicability of computing devices.

Von Neumann was born in 1903 in Budapest, Hungary. He attended the University of Budapest, specializing first in chemical engineering and then in mathematics. He received a Ph.D. in mathematics from Budapest at the age of 22 and, in 1927, having already published several papers on algebra, set theory and quantum mechanics, became a *Privatdozent* at the University of Berlin. In 1930,

By Nancy Stern

IN DEPTH

Princeton University invited him to be a visiting lecturer, an appointment he held for three years. In 1933, he received a permanent position at Princeton's newly created Institute for Advanced Study.

Von Neumann's reputation as one of the world's most distinguished mathematicians was clearly established by 1940. A highly proficient and prolific scholar, he had already published important papers in such fields as ergodic theory, operator

With the onset of World War II, von Neumann's knowledge of mathematical physics proved of great value to his adopted country. His contributions to supersonic wind tunnel development and solutions to nonlinear systems of equations and implosion were instrumental in advancing the Allied cause.

theory and formal logic. Moreover, like David Hilbert and Richard Courant before him, von Neumann was instrumental in promoting the disci-

pline of mathematical physics as an appropriate subject for pure mathematicians. He was well known for work on the logical and mathemati-

cal foundations of quantum theory and on problems in statistical mechanics.

As Stanislaw Ulam, a close friend and colleague of von Neumann at Los Alamos Scientific Laboratory, stated: "He was not entirely what one might call a mathematician's mathematician. Purists objected to his interests outside of mathematics when very early he leaned toward applications of mathematics or when he wrote as a young man about problems in quantum theory."

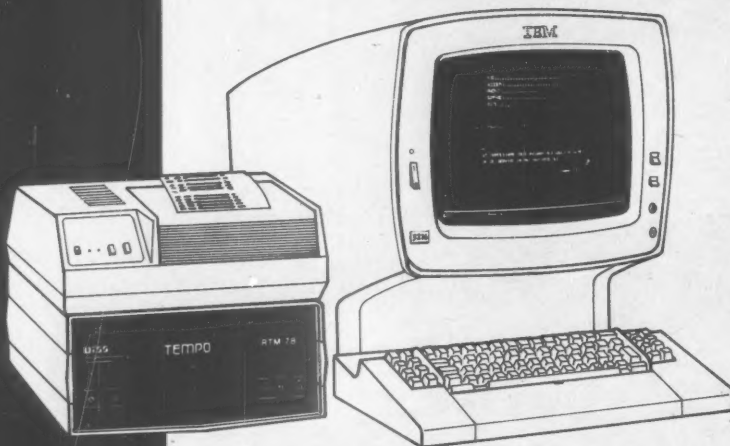
With the onset of World War II, von Neumann's knowledge of mathematical physics proved of great value to his adopted country. P.R. Halmos, a fellow mathematician, wrote, "Whether the war made him into an applied mathematician or his interest in applied mathematics made him invaluable to the war effort, in either case he was much in demand as a consultant and adviser to the armed forces and to the civilian agencies concerned with the problems of war." His contributions to supersonic wind tunnel development and solutions to nonlinear systems of equations and implosion were instrumental in advancing the Allied cause.

During and after the war, his main professional interest shifted from pure to applied mathematics, a reorientation that lasted until his death in 1957. "The year 1940 was just about the halfway point of von Neumann's scientific life, and his publications show a discontinuous break then," Halmos has pointed out. "Till then he was a topflight pure mathematician who understood physics; after that he was an applied mathematician who remembered his pure work." In all, his collected works, which include papers on both pure and applied mathematics, fill six volumes.

During the war, von Neumann was a consultant to various government agencies, including the Army's Ballistics Research Laboratory, the Navy Bureau of Ordnance and the Los Alamos Scientific Laboratory. In addition to making significant scientific contributions to these organizations, von Neumann was instrumental in providing direction to their research.

Von Neumann's role during the war provided him with a status and influence achieved by very few

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IN DEPTH

mathematicians. Pure mathematics was at that time usually viewed as too abstract for most practical applications. Von Neumann made every effort to establish the social utility of the sciences in general and one specific concern was to legitimize the role of mathematics in particular as a practical and useful science. Ulam, in an obituary written for the American Mathematical Society in 1958, the year after von Neumann's death, pointed to this aspect of von Neumann's interest:

"Perhaps his main desire and one of his strongest motivations was to help reestablish the role of mathematics on a *conceptual level* in theoretical physics. The drifting apart of theoretical mathematical research and of the mainstream of ideas in theoretical physics since the end of the First World War is undeniable. Von Neumann often expressed concern that mathematics might not keep abreast of the exponential increase of problems and ideas in physical sciences."⁴

By 1944, von Neumann had a reputation as a distinguished mathematician and as a scientific leader with vast influence in governmental and academic circles. His relationship with government agencies put him in a position to make policy recommendations, as well as technical and administrative ones, regarding the scientific resources of the nation. Moreover, he seemed to value this sense of power. Ulam remarked that "von Neumann seemed to admire generals and admirals and got along well with them" — a characteristic Ulam attributed to von Neumann's "admiration for people who had power."⁵

Interest in Computation

It would be difficult to determine precisely when von Neumann first became interested in digital computers, but as a result of his war work on implosion, he was cognizant of the critical need for advanced methods of digital computation. As Herman Goldstine stated in his book *The Computer From Pascal to von Neumann*, von Neumann attempted to show, while at Los Alamos, "the theoretical people how to model their phenomena mathematically and then to solve the resulting equations numerically. A punched-card laboratory was set up to handle the implosion problem."

But punch-card equipment was very slow and inefficient. Von Neumann became actively interested in more advanced computational equipment. His work on implosion at Los Alamos required solutions of systems of nonlinear equations in fluid dynamics. Since existing manual methods for solving these problems were extremely time-consuming, he sought an alternative. Von Neumann sensed that digital computers might prove useful in this regard.

Though von Neumann's interest in instruments for scientific calculations was shared by some innovators

in the computing field, it was decidedly uncharacteristic of pure mathematicians in general. Numerical methods can give only approximate solutions of differential equations. For pure mathematicians who tend to view theory as superior to empiricism, approximations were lacking in rigor and therefore totally unacceptable in theoretical work.

Thornton Fry of Bell Laboratories and the National Defense Research Committee, in his article "Industrial

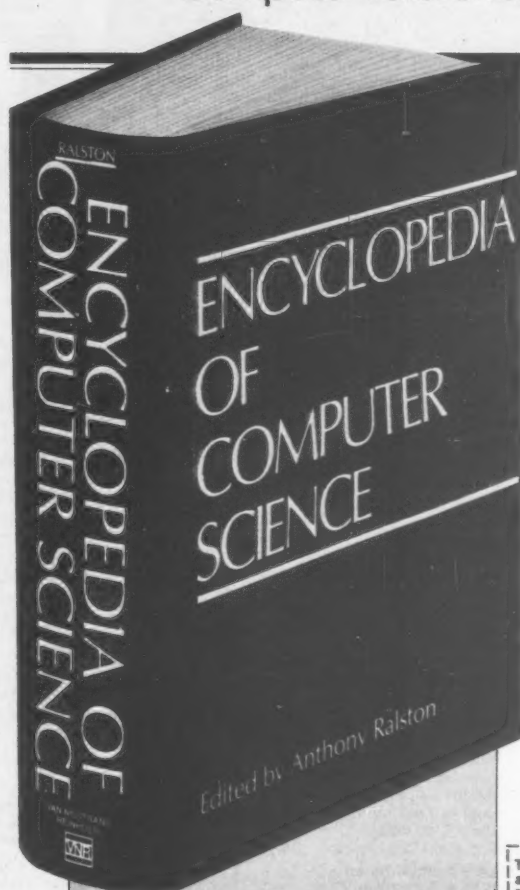
Mathematics," summed up the typical attitude of industrial engineers toward pure mathematicians in the early 1940s: "Just now an attitude more commonly met ... is one of amazed pride in pointing to some employee who isn't like most mathematicians; he gives you an answer you can use and isn't afraid of approximations."

Von Neumann shared with applied mathematicians, particularly those engaged in war work, the realization

that approximations serve a useful purpose in solving practical problems and can frequently facilitate the solution of theoretical problems as well.

Hence, his enthusiasm for computational equipment went further than his effort to minimize the labor required for solving his own problems; he hoped to demonstrate its value to science. In fact, one of von Neumann's major contributions during and after the war was his legitimiza-

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"Case History in MIS Productivity Improvement" Daniel Merrell, Manager, Productivity and Technical Training, Union Carbide Corporation

"Applying 'Theory Z': A Case History in Implementing Japanese Management Techniques in the U.S. Computer Industry" John Rehfeld, VP and General Manager, Toshiba America, Inc., Information Processing Systems Division

"Data Processing Management's Role in Office Automation" Walter E. Ulrich, President, Walter E. Ulrich Associates

Hardware & Capacity Planning

"Performance Modeling" Barry Stevens, VP, Performance Management Associates

"Software Engineering in the Productivity Environment" Ken Kolence, President, Institute for Software Engineering

"Reducing System Definition-Development Lifecycle Costs" Gopal K. Kapur, President, Kapur & Associates, Inc.

Human Resources

"The Personnel Crunch in Data Processing" Harold S. Bott, Partner, Arthur Anderson & Company

"The Programmer Gravy Train Derails" Charlene Franci, Consultant, Quality Assurance, Security Pacific National Bank, with Thomas J. Franci, Director, Information Services, The Bekins Co.



Telecommunications & Distributed Processing

"New Application Opportunities in Telecommunications" Professor Leonard Kleinrock, School of Engineering & Applied Science, University of California at Los Angeles

"Social and Economic Impact of Telecommunications" Dean Gillette, Executive Director, Corporate Studies, Bell Laboratories

"Using Non-IBM Systems in SNA Environments" Saroj K. Kar, President, Telcom Computer Technology International

"Future of the SNA Applications Environment" John King, President, 3K Group

Software Development & User Applications

"Improving Programming and Programmer Productivity" Jack E. Ewers, Manager, Systems & Programming, Honeywell, Inc.

"Engineering Fourth Generation Software Products and User Applications" Martin Goetz, Senior Vice President, Applied Data Research, Inc., Director, Software Products Division

"Productivity Leverage Through System Utilities" Asa Lanum, Vice President/Advanced Development, Pansophic Systems

"Higher Level Languages: Status, Prospects & Payoffs" Jim Wilcox, VP, Heneco, Inc.

Software Strategy

"IBM Software Strategy for the 1980's" Robert Cook, VP, VM Software

"Large Processor Architecture Trends" Bryant Jeffries, Strategic, Inc.

"Guaranteed Systems: Applications Development Through Hardware Concepts" Dan Nolan, Deputy Director, Business Data Processing, Computer Sciences Corporation, Systems Division

"Survivable Systems" Dr. W.H. Highleyman, President, Somers Associates, Inc.

Database

"Strategies & Implementation of the Corporate Data Base" Leo Cohen, President, Performance Development Corporation

"Data Structured Design for Distributed Data Processing" Hugh W. Ryan, Arthur Anderson & Company

"Mainstream Choices In Database" Charles Bachmann, Vice President, Cullinane Data Base Systems

Market Opportunities

"Future of the PCM Mainframe Vendors" Duane Kirkpatrick, Partner, Robertson, Coleman, Stephens & Woodman

"Telecommunications: The Bridge Between Word and Data Processing" Walt G. Frederickson, Vice President, Technology, Harris Corp.

"Local Networks: Planning For Maximum Application Potential" Frank Dzubeck, President, Communications Network Architects, Inc.

"Have You Missed The Venture Capital Boom?" Roy Rogers, Partner, Hambrecht & Quist

"Measuring And Improving Programmer Productivity" Girish Parikh, President, Shetal Enterprises

"Why Management Hates DP (And What To Do About It)" Walter Lankau, Vice President, Management Decision Systems

"How to Cut Support Costs with Professional Documentation" Stephanie Rosenbaum, President, Tech-Ed

"Concepts and Trends in Information and Data Resource Management" Steven H. Spewak, Vice President, Performance Development Corp.

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"The Economic Outlook for the OBM...Boom or Gloom" Chairperson:

Adolf "Sonny" Monosson, Chairman, American Computer Group, Inc.



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"The Vertical Marketing Survival Guide" Chairperson: Lawrence D. Dietz, MBA, JD, President, The Alec Group



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"The OEM Market Analyst ... A Look to the Future" Chairperson: Tom Casalegno, Vice President, Publisher, Computer Business News



"Retail Takes on a New Meaning for the OEM" Chairperson: Deborah de Peyster, East Coast Bureau Chief, Computer Business News



"The European Market ... How to Break in Successfully" Christopher G. Codrington, Managing Director, Interco Business Consultants Ltd.



"OEM Technology...An Intense Overview" Chairperson: Vic Farmer, Editor, Computer Business News



"Survival Tools in the 80's" Chairperson: Richard C. Cole, President, Computer Results, Inc. and Michael R. Wood, Partner, Andreoli, Johanson & Wood



"Marketing Strategy: Tools To Ensure Continued High Profit" Jack M. Keen, Director, Management Products, INPUT



"The Independent Software Business Vendor" Chairperson: Rory O'Connor, Senior Editor, Software, Computer Business News



"Taxes ... The Software State Tax Issues" Rory O'Connor, Senior Editor, Software, Computer Business News

"Fortune 500 Manufacturers...As OEM Opportunities" Neil Kleinman, International Data Corp.

Other Topics of Interest

"Software...The State of the Art" • "Software for the Vertical Marketplace" • "The Local Network Avalanche" • "Financial, Banks and Insurance Companies...As OEM Opportunities" • "The Process Control Industry...As An OEM Opportunity"

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"After 'Visicalc,' What?" Daniel S. Bricklin, Chairman of the Board, Software Arts

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IN DEPTH

tion of applied mathematics as a scholarly field and his attention to computers as scientific instruments.

The Moore School

In August 1944, von Neumann learned about the U.S.' first electronic digital computer, the Eniac, being developed at the Moore School of Electrical Engineering of the University of Pennsylvania under the direction of J. Presper Eckert Jr. and John William Mauchly after attending a

Von Neumann suggested in 1944 that the Los Alamos group working on the hydrogen bomb could use the Eniac for its complex calculations. It was largely as a result of his influence that the first application, or test, of the Eniac was for Los Alamos.

Scientific Advisory Committee meeting at the Ballistics Research Laboratory in Aberdeen, Md. He met Herman Goldstine, the laboratory's liaison on the Eniac project, who

ventured to introduce himself.

As Goldstine later recalled: "I was waiting for a train to Pennsylvania on the railroad platform in Aberdeen when along came von Neumann.

Prior to that time I had never met this great mathematician, but I knew much about him, of course, and had heard him lecture on several occasions. It was therefore with considerable temerity that I approached this world-famous figure, introduced myself and started talking.

"Fortunately for me, von Neumann was a warm, friendly person who did his best to make people feel relaxed in his presence. The conversation soon turned to my work. When it became clear to von Neumann that I was concerned with the development of an electronic computer capable of 333 multiplications per second, the whole atmosphere of our conversation changed from one of relaxed good humor to one more like the oral examination of the doctor's degree in mathematics."

Beginning in September 1944, von Neumann took time from his Los Alamos work to make periodic visits to the Moore School to learn more about the Eniac and to make technical recommendations on the Edvac, the school's second electronic computer. Since the design of the Eniac had been frozen in June 1944, von Neumann had little to do with the actual technological features of that machine. He did, however, suggest that the Los Alamos group working on the hydrogen bomb could use the Eniac for its complex calculations. It was largely as a result of his influence that the first application, or test, of the Eniac was for Los Alamos.

Von Neumann's interaction with the Moore School had two immediate effects. First, it legitimized and justified the project to other government agencies such as the National Defense Research Committee. Despite the substantial technical accomplishments already achieved by the Eniac, von Neumann's presence was an effective method for gaining added recognition.

Second, it was soon after von Neumann became interested in the Eniac that the Moore School requested and received a contract for the development of the new and more powerful Edvac, which was to have stored-program capability. Von Neumann contributed to the logical design theory

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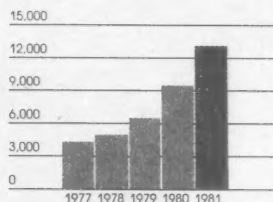
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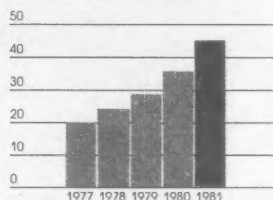
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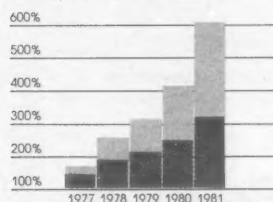
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IN DEPTH

for the Edvac and stored-program computers in general.

Stored-Program Concept

The Eniac progress report on Dec. 31, 1943 emphatically stated that, for the sake of expediency, the project staff elected to omit any automatic programming capability: "No attempt has been made to make provision for setting up a problem automatically. This is for the sake of simplicity and because it is anticipat-

ed that the Eniac will be used primarily for problems of a type in which one setup will be used many times before another problem is placed on the machine."

In January 1944, when the Moore School staff began to consider the development of a device more comprehensive than the Eniac, Eckert wrote a one-page disclosure broadly indicating a stored-program machine: "If multiple shaft systems are used, a great increase in the available facili-

ties for allowing automatic programming of the facilities and processes may be involved. This programming may be of the temporary type set up on alloy disks or of the permanent type of etched disks."

Thus, months before von Neumann knew of the Moore School work, the stored-program concept had been conceived, if not developed. With von Neumann's assistance, however, this concept was carefully structured and developed in the period be-

tween 1944 and 1945.

In June 1945, von Neumann prepared a report called "First Draft of a Report on the Edvac," a paper on stored-program computers, which, as its title implies, was intended as a preliminary and informal document. Goldstone distributed the 101-page report to members of the Moore School staff and also to interested scientists not associated with the Edvac. (The distribution list was entitled "Topics of von Neumann's Report, Logical Analysis of Edvac.")

The report was the first widely circulated document on electronic digital computers. The exact number of copies distributed at the time is not known; at least 32 people were on the original mailing list, but many others received copies later on. The report consisted of a series of definitions of concepts relating to logical control and stored programming. It also included a section on how computers, in principle, could be used to operate on data.

The contents of these sections formed the basis for computer and stored-programming design in the late 1940s. The draft report also included a section emphasizing the similarity between computer processing and the activities of the human nervous system, a topic that was one of von Neumann's major interests.

Since the draft report bore von Neumann's name as sole author, the stored-program concept was thought by computer professionals, as well as by many historians, to have originated with him. As a result, most studies have credited him with the origin of this concept, to the exclusion of all other participants.

In *The Computer From Pascal to von Neumann*, Goldstone has supported the claim that von Neumann was primarily, if not exclusively, responsible for this concept. Early in the book, he flatly states: "Von Neumann developed the revolutionary concepts of the stored program." Later, on Page 191, Goldstone says that von Neumann's draft report "represents a masterful analysis and synthesis by him of all the thinking that had gone into the Edvac from the fall of 1944 through the spring of 1945. Not everything in there is his, but the crucial parts are."

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System Interfaces: IBM Systems 360, 370, 303X and 43XX.

Compatibility: IBM 327X plug compatible; Bisynchronous; SNA/SDLC (2078/2087).

Product Specifics: The 2078 Display Station is built for flexibility, operating in bisynchronous as well as SNA/SDLC environments. It is built compactly to conserve space and even features a monitor that detaches for shelf placement. It is built to conserve energy, with efficiency features that allow the 2078 to operate on 58% less power while generating 47% less heat than its IBM equivalent. It weighs just 55 pounds, some 41% lighter than the IBM competition. And above all, the 2078 is built for people. The monitor is tiltable and the screen recessed. That screen, the keytops and all moldings are non-glare. The keyboard is movable for comfortable positioning.

The 2087 Matrix Printer also features SNA/SDLC protocol compatibility in addition to bisynchronous operation. It is both fast and quiet. A microprocessor-controlled print mechanism delivers high quality printouts at speeds up to 50% faster than the IBM equivalent. A bidirectional matrix print head seeks the shortest path to the next line, backwards and forwards, maximizing throughput. Acoustical engineering reduces noise levels, while a membrane switch panel, controls and LED indicators, all located on the front panel, provide the operator with local control and printer status.

The 2076 Remote Cluster Controller is a lightweight 30-pound package that accommodates up to eight printers and/or terminals in a bisynchronous environment. It measures a streamlined 6.5" high x 14" wide x 28" deep. While the 2076 can be located as far away as 4920 feet from its attachments, its dimensions allow for convenient placement just about anywhere, singly or stacked. Standard power-on, off-line and on-line diagnostics contribute to increased uptime.

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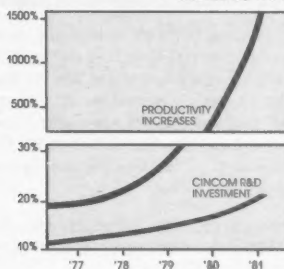


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IN DEPTH

Arthur W. Burks, a mathematician who worked as an engineer on the Eniac and Edvac projects, supports the view that the ideas in the draft report were primarily von Neumann's: "Goldstine brought von Neumann in as a consultant, and we all participated in discussions of the logical design of such a machine... Von Neumann then worked out in considerable detail the logical design of this computer. The result appeared in his 'First Draft of a Report

on the Edvac,' which was never published."⁹

'An Historical Error'

In 1976, Nicholas Metropolis, the Los Alamos scientist who also had worked closely with von Neumann, collaborated with Jack Worlton on an article that provides a different view of the derivation of the ideas explained in the draft report: "Another point concerning the stored-program history which needs clarification is

the unwarranted assumption that J. von Neumann alone deserves the credit for the stored-program concept... It is clear that the stored-program concept predates von Neumann's participation in the Edvac design.

"That von Neumann is often given credit for this fundamental concept is likely due to the fact that he wrote a preliminary report which summarized the earlier work on the Edvac design, including the stored-pro-

gram concept. Von Neumann contributed significantly to the development of this concept, but to credit him with its invention is an historical error."¹⁰

Harry Huskey, a Moore School engineer himself, provides a similar retrospective view: "After von Neumann's introduction to the Eniac, there were a number of meetings between him and the Eniac staff discussing various ideas and proposals. As a joint effort, this group developed the concept of a stored program. The results of this activity were written up by von Neumann in a 'draft' report which, not being in final publication form, did not give due credit to others for the development of the ideas. However, the report was reproduced in this draft form and circulated quite widely. As a result, von Neumann has generally received credit for this idea."¹¹

In short, von Neumann's report on the Edvac was the first document to provide a logical framework for stored-program computers and for programming concepts. His attention to providing a written record and his development of automatic controls that had been conceived, but not yet designed by the Moore School staff, were factors leading others to credit him with priority.

Von Neumann's interest in computers as tools for the mathematician led him, in the early part of 1945, to seek support for his own computer project. The manner in which he sought and achieved his objective sheds light on his entrepreneurial and innovative abilities.

IAS Computer

During the war, von Neumann was still a member of the Institute for Advanced Study (IAS), an institution noted for its pure research and its "ivory tower" attitude toward applied work. Even in physics, a major subject field at IAS, the emphasis was theoretical rather than experimental. IAS had limited laboratory facilities, prompting von Neumann's friend and colleague, Norbert Wiener, to write him on March 24, 1945, "You are going to run into a situation where you will need a lab at your fingertips and labs don't grow in ivory towers... Harrison wants to find out if you would come to MIT."

Yet von Neumann set out to establish his computer project at IAS, a task of considerable magnitude, even for a man of his stature. He began by actively seeking a commitment for his project from other major universities and from IBM as well. MIT, Harvard, the University of Chicago and IBM were all eager to support his work. By the summer of 1945, it was clear to Frank Aydelotte, director of IAS, that von Neumann would resign if his project were not approved. As a result, in a radical departure from its traditional role, IAS agreed to undertake a computer project. Von Neumann's skill in achieving this objective is clearly analogous to the

Distributed Data Processing

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Read about the changing face of DDP in Computerworld's February 22nd Special Report, "Distributed Data Processing."

Qualified DP/MIS people are expensive and hard to come by. Some companies are coping with this problem by changing the traditional concept of Distributed Data Processing. Functions requiring high-level DP skills are being recentralized, and easy to operate, less intelligent remote job terminals run by people without expensive, unnecessary qualifications are being put into the field. A central processor coordinates the network and performs the more difficult tasks. But, will cutting back on the "fancy functions in the field" really save you enough money? Edited by Tim Scannell and Tom Henkel, "Distributed Data Processing" will address this question as well as important issues such as:

- **Security:** its importance as traffic and networks increase. What approaches to DDP security have users found effective, and where have supposedly fail-safe systems failed?
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Plus, we'll be taking a look at the DDP philosophical and marketing rivalry—attaching minicomputers to a host computer vs. eliminating the host in favor of a network of minis.

If you're a user who watches the trends, you'll want to have the most up-to-date information about DDP and you'll find it in our February 22nd Special Report. And if you're marketing products or services in the DP field, you'll want to make sure your ad is there. Ad close is February 5th. Contact your Computerworld salesperson, or call Frank Collins at (617) 879-0700.



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innovator's unusual ability to "sell" his product.

Dual Motives

Von Neumann had two primary motives for undertaking such a project. First, he was firmly committed to demonstrating the utility of a computer "as a research tool" and not, he repeatedly emphasized, "as a production facility."

Second, despite his pure science ideology, he was committed to estab-

lishing the social utility of mathematics in general.

Since computers were socially useful machines and von Neumann had already demonstrated their mathematical/logical structure, the computing field represented an ideal discipline in which mathematicians could firmly establish their social value. Mathematicians who engaged in computer design would stand to benefit from the government-funded research that was to become a post-

war norm; at the same time, they could formalize their role in applied science.

In conclusion, Von Neumann helped to formalize the logical design features of the Edvac, the world's first electronic digital computer designed to incorporate stored-program capability. He also undertook a computer project at IAS which, when completed, served as a model for numerous other academic and research institutions.

But another dimension of von Neumann's influence was at least as important. He was able to convince a very dubious mathematical community that the electronic digital computer was a useful scientific instrument that could be developed at academic institutions. He brought together those who were capable of contributing to computer development and those who could benefit from it.

Despite these and later numerous contributions to computing and mathematics, Von Neumann's work in some areas depended, in varying degrees, on the efforts of others. The stored-program concept is one important example.

NOTES

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3. *Ibid.*
4. Ulam, "John von Neumann, 1903-1957," *Bulletin, American Mathematical Society* 64, p. 20.
5. *Adventures of a Mathematician*, p. 245.
6. Herman H. Goldstine, *The Computer From Pascal to von Neumann*, Princeton University Press, Princeton, N.J., 1972, p. 182.
7. "Eniac Progress Report," Dec. 31, 1943, *University of Pennsylvania Archives* (UPA).
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About the Author

Nancy Stern is associate professor and chairwoman of the Department of Administrative Computer Systems at Hofstra University, Hempstead, N.Y. She is also assistant editor-in-chief of the *Annals of the History of Computing*.

Stern is a historian with a background in computer science and has written several textbooks on programming languages. Her recent book *From Eniac to Univac* is published by Digital Press.

Stern holds a B.A. in mathematics from Barnard College, an M.A. in computer science from New York University and an M.A. and Ph.D. in the history of science from the State University of New York at Stony Brook.



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Mass Storage Unit For HP 3000, 1000 Boasts Capacity

SUNNYVALE, Calif. — A disk subsystem from a subsidiary of Micro-computer Systems Corp. reportedly provides Hewlett-Packard Co. processors with more capacity than any other HP-compatible mass storage unit now on the market.

United Peripherals, Inc.'s UP-1698 holds 480M bytes of formatted data and is reportedly compatible with the HP 3000 series, including the Models 30, 33, 40, 44 and 64, as well as the HP 1000.

Built around Control Data Corp.'s Model 9775 fixed-module disk drive, the UP-1698 attaches directly to the HP Interface Bus (HPIB) and emulates the 12745A HPIB interface. The subsystem also emulates the HP 7925 disk unit and the HP 13037C disk system controller, according to a United Peripherals spokesman.

Support capabilities for the UP-1698 reportedly include local diagnostics, remote diagnostics from United Peripherals' central service center and a staff of field engineers for emergency on-site maintenance.

The subsystem provides a 25-msec average access, transfers 1.2M byte/sec, stores 675M bytes of unformatted data and rotates at 3,600 rev/min with a 8.3-msec average latency. Capable of storing 20,160 byte/track and 806,400 byte/cylinder, UP-1698 also boasts 843 cylinders, with 40 track/cylinder, the spokesman said.

The subsystem will be sold directly to end users for \$34,500 and is available immediately from United Peripherals at 432 Lakeside Drive, Sunnyvale, Calif. 94086.

Minis Managing Trades Help E.F. Hutton Manage

Special to CW

NEW YORK — How does one of the nation's largest brokerage firms — with more than a half million clients — keep track of its own operations and an investment banking operation as well?

It does it with experience, strong operations capabilities and a number of minicomputers that manage the firm's principal trading activities (in which the firm buys and sells for its own account) and handle payroll and bookkeeping for more than 10,000 employees across the country.

Insurer Covers Floods, Quakes

MANCHESTER, N.H. — The New Hampshire Insurance Group has announced a specialized coverage insurance policy, the Mini-Computer Protector, that reportedly provides broad protection for small computer systems including coverage for loss due to electrical disturbance, flood and earthquake.

The Mini-Computer Protector covers equipment up to \$100,000 per location, the vendor said, and media and extra expenses for 25% of equipment amount.

Rates range from 30 cents to 60 cents per \$100 of equipment, depending on the building, the deductible selected and the presence of smoke detectors and fire extinguishers.

Higher amounts for media and extra expense coverage are available. This coverage is not available in some states. More information can be obtained from the New Hampshire Insurance Group, Box 960, Manchester, N.H. 03107.

Headquartered here in New York, E.F. Hutton has more than 300 offices worldwide and about 3,500 account executives that provide investment advice and financial services to individual and corporate clients. Since the investment firm is a business, and would like to make money just like any other business, it also dabbles in trading where large amounts are often at stake.

In the past, data on these trades were processed through a combination of manual methods and off-line computer support. However, now the company uses four minicomputers — all configured with the same memory and processing power — to manage these trades and support a variety of back-office functions.

Wang Models

The four systems are all Wang Laboratories, Inc. VS models, each with 512K bytes of main memory; two tape drives; and four disk drives, two with a 75M-byte capacity and two that can store up to 300M bytes of data. Together, the four systems support more than 100 workstations, offering both word and data processing capabilities, Vincent Pica, vice-president of management information systems operations for the brokerage firm, said.

E.F. Hutton's principal trading system moves collection and correction of trading data to their point of origin. It also links interactive on-line data entry on a dedicated VS with batch bookkeeping on another system.

Every morning, a list of opening positions is loaded via tape onto the VS. Based on these positions, tickets are written and passed along to the trading floor where

(Continued on Page 50)

Mini Bits

Others' Printers Tied To Datapoint CPUs

WICHITA, Kan. — DP-Tek, Inc. has announced the 94-D, a printer interface that allows users of Datapoint Corp. processors to use non-Datapoint printers.

The 94-D allows a Datapoint system to accept Dataproducts Corp. printers or parallel printers. It can be plugged into the Datapoint hardware and does not require software modifications, the vendor said.

The unit costs \$400 and is available immediately. The vendor can be reached through P.O. Box 2411, Wichita, Kan. 67201.

Board Expands S-100 Into Multiuser System

SOUTHFIELD, Mich. — Manumatic International, Inc. has announced the Data Share circuit board that reportedly expands a single-user S-100 bus system into a multiuser system.

The board includes a 4MHz Z-80A microprocessor with 64K bytes of random-access memory, 2K bytes of erasable programmable read-only memory,

two serial ports and one parallel port, the vendor said.

The Data Share board costs \$1,000, according to the firm at 22077 Telegraph Road, Southfield, Mich. 48034.

Turnkey Developed For Auto, Parts Dealers

STONY BROOK, N.Y. — Heineck Associates, Inc. has announced a turnkey system aimed at automobile dealers or automotive parts retailers/distributors.

Based on the IBM System/23 Datamaster, Auto/23 includes inventory control, billing, invoicing, accounts receivable and mailing labels.

Hardware and software costs \$15,000 from the firm at 1 Carriage Court, Stony Brook, N.Y. 11790.

Turnkey Fits Needs Of Tractor Dealers

BELLINGHAM, Wash. — Dis Corp. has developed an IBM System/23-based computer system for the smaller tractor and equipment dealer.

Dealermaster consists of the System/23 hardware with Parts Inventory Control and Whole

Goods Inventory Control software developed by Dis. Accounting and word processing software for the system is available from IBM.

Dealermaster software costs \$5,100, including data entry and training materials, and the hardware costs "less than \$11,000," a company spokesman said from 1221 Fraser, Bellingham, Wash. 98226.

Seagate Announces Micro-Winchester

SCOTTS VALLEY, Calif. — Seagate Technology, Inc. has announced the ST412, a 5¼-in. micro-Winchester disk drive.

The unit features 12.76M bytes of unformatted storage and 10M bytes of formatted storage.

The drives cost \$1,620, the vendor said from 36011 Pueblo Road, Scotts Valley, Calif. 95066.

Turnkey Legal System Based on Wang Mini

PHOENIX — Informatics, Inc. has announced a turnkey Legal Time Management System (LTMS) based on a Wang LVP

minicomputer.

The hardware/software combination is designed for the lower end of the legal systems market. It can perform both word and data processing functions. Software was developed at the firm's Professional Software Systems Division, the vendor said.

The basic LVP processor configuration costs \$19,200. An optional daisy wheel printer costs \$7,400 and the LTMS software costs \$16,000, the vendor said from 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

Apollo Users Get Winnie Disk Option

CHELMSFORD, Mass. — Apollo Computer, Inc. has announced the addition of a 66M-byte Winchester disk option to its line of distributed systems.

With the disk, Apollo users now have a choice of either the standard 33M-byte disk priced at \$8,400 or the double-density 66M-byte disk priced at \$12,000. Field upgrades to the 66M-byte disk are available for \$14,500.

Apollo is at 19 Alpha Road, Chelmsford, Mass. 01824.

Minicomputers Help E.F. Hutton Manage

(Continued from Page 49)

they are entered into another VS by at least two operators. Two operators enter the same information to ensure accuracy. If the entries match, the computer updates the position and at the same time generates a sale.

At night, transaction records are spooled to tape and fed into one of the VS systems, which then books profits or losses to the various general ledger accounts. The computer also recalculates the company's holdings.

By morning, new figures and opening positions are ready, loaded into the VS computer and available to operators on the trading floor. On the bond floor, operators process data on an average of 800 trades per day

while operators on the over-the-counter floor handle nearly four times that amount.

The VS systems supply E.F. Hutton traders with a printout on securities, updates within minutes from printers located throughout the trading floor and statistical reports that can be used to map investment strategies, Pica explained.

Since all four VS computers are similar, the system has a built-in redundancy.

The computers also handle record keeping for E.F. Hutton clients. On terminals, operators record stock movements and make transfers based on a file that lists the codes of all the securities held by the firm's customers. This file is updated and loaded

into one of the VS computers each morning.

Workstations Used

Workstations are also located in the firm's vaults where client's stock certificates are stored. As batches of securities are allocated to different locations, files in the computers are updated via the workstations.

Finally, the VS computers handle personnel administration via a modified version of Wang's Human Resource Management System.

The personnel system has been altered by E.F. Hutton programmers to segregate different earnings scales, compute taxes separately for each earning and recombine entries on a single paycheck, according to Pica.

The VS system is also used by the firm's Corporate Finance Group for electronic mail and word processing and will eventually include Mailway, a Wang system that allows the further integration of word and data processing.

Jonos Offers Eprom Card

ANAHEIM, Calif. — Jonos Ltd. has announced a 32K-byte random-access memory (RAM)/erasable programmable read-only memory (Eprom) card, the JL-32K.

The card is available in zero, 8K-, 16K- or 32K-byte configurations and draws 1W of power when fully populated. It uses 2,716 Eproms or 2K-byte-wide static RAMs with a 250-nsec access time.


The 32K-byte version costs \$550, the 16M-byte version costs \$350, the 8K-byte version costs \$250, and the zero memory version (socketed for Eproms) costs \$150, the vendor said from 920-C E. Orangethorpe, Anaheim, Calif. 92801.

Cmos RAM Board Backs LSI-11 Bus

WOBURN, Mass. — Adac Corp. has announced a battery-backup Cmos random-access memory (RAM) board for Digital Equipment Corp. LSI-11 Bus systems.

The Model 1816Cmos half-quad size board occupies a single slot in the LSI-11 backplane. It features 168-hour data retention.

There are four models. A 16K-word version with 30-day retention costs \$1,295, a 16K-word version with 168-hour retention costs \$1,095, an 8K-word version with 30-day retention costs \$795, and an 8K-word version with 168-hour retention costs \$695, the vendor said from 70 Tower Office Park, Woburn, Mass. 01801.



COMPUTERWORLD OA

MEMO TO: CW Subscribers

RE: Your first issue of Computerworld OA is coming March 31, 1982.

FROM: Bob Ziegel, Vice President Special Publications

The office of the future we've dreamed about is here today. And now more than ever, staying abreast of changes in the rapidly expanding office automation field is important to the success of every organization. To guide you through the latest OA developments, we're announcing our newest publication, Computerworld OA. The first of four issues for 1982 is scheduled for March 31st.

Every Computerworld subscriber will receive a copy of these special issues as an extra bonus and more copies will be distributed at major shows in 1982. OA is edited by Ann Dooley and here are just some of the major topics you'll be reading about in our first issue:

- Find out who are the OA users and what OA applications are available to them.
- Read about the latest OA implementation strategies.
- Get a thorough overview of decision support systems.
- What are the management issues of integrating OA into the organization?
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- How has OA made the best use of personal computers?
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- Get the latest information on voice mail systems.
- The lack of standardization and what users can do to compensate.
- Computer graphics—how to produce your own slides.
- In-depth evaluations of new OA products.
- Plus—a feasibility cost justification story.


The format of these four special Computerworld OA issues will be the familiar "tabazine" developed for CW Extra. Each issue will be tabloid size with magazine format for editorial content and advertising. Covers will be printed on glossy stock, and supercalendared, high-quality newsprint will be used on the inside.

Best regards,

Bob Ziegel

P.S. **FOR ADVERTISERS:** You can reach the people who are responsible for taking their companies into the office of the future with your ad in Computerworld OA.

Advertising close is February 19th and we'd be glad to give you more advertising information—as well as complete details on our subscribers and readers. Just contact your local Computerworld Sales Office, or, call Bob Ziegel, Vice President Special Publications, CW Communications/Inc. at (800) 343-6474.




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
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Not Corporate Systems Chief Line Managers Seen Force Behind OA

By Brad Schultz
CW New York Bureau

ATLANTA — Line managers, not the corporate systems chief, will drive demand for office automation, a Digital Equipment Corp. manager predicted here at a recent conference.

Robert Erickson, who is responsible for providing DEC with internal office systems, indicated that office automation is mainly an end-user tool destined to be quite popular, but only as soon as end users can see the need for it.

"When [end users] try it, they'll like it," Erickson told a conference session. And office automation will be tried vigorously, he said, when end users in an organization come to envy the peer departments that have such systems and, as a result, achieve unprecedented productivity levels.

Erickson called the idea that many conservative managers will resist office systems implementations "largely a myth." Office automation may cause changes in company procedures that are, for a while, unsettling to managers, but nearly all managers will find ways to enrich their departments with the new technology, he declared.

Office automation is likely to make secretarial work less mundane, the DEC manager added, allowing secretaries to be more involved in "business processes." Hence, the technology may blur conventional distinctions between clerical and administrative personnel.

And Makes Enhancements.

Wang Adds Systems to OIS Line

LOWELL, Mass. — Wang Laboratories, Inc. has announced additions and enhancements to the entry-level systems of its OIS office automation systems series.

The OIS 105-1 is a new entry-level system offering 4.2M bytes of storage, the DW-20 printer and a 32K-byte CRT terminal. It costs \$12,995.

The OIS 115-3 and 115-4 models are also new. The 115-3 CPU has 16M bytes of storage, eight ports and costs \$15,400. The 115-4 CPU has 32M bytes of storage, eight ports and costs \$21,400.

The enhanced OIS 115-2 CPU, with 8.4M bytes of storage, has been reduced in price to \$10,400.

Telecommunications supported on the 115-3 and 115-4 are teletypewriter, IBM 2741, 2780, 3270 and Wang's Mailway electronic mail and message system. These systems can also support Wise (the Wang Inter-System Exchange) for local network resource sharing.

To further increase functiona-

Experience with office systems at DEC suggests that implementations should address the smallest possible administrative unit, Erickson noted. That means configurations of a processor, workstations, printers and other peripherals should not be shared by different units because resource shar-

ing leads to fights. Each unit should have its own resources, assuming responsibility for justifying their expense, Erickson observed.

Within a local network, mass storage should be concentrated in one place rather than allocated to individual workstations. When data is routinely stored

in floppy disks at each workstation, security is difficult to maintain, he explained.

Many implementation decisions may be decentralized, but a corporate department should exist to promulgate standards and policy on such matters as interfacing and security, Erick-

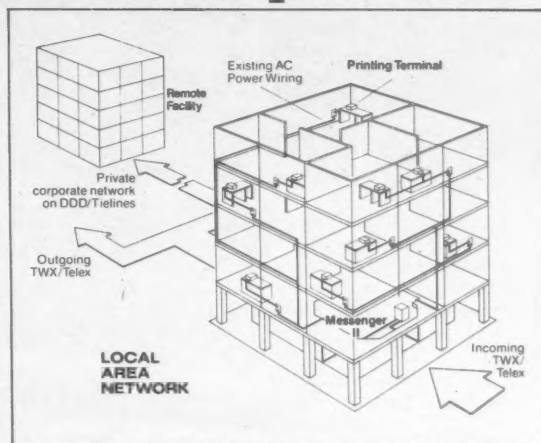
(Continued on Page 54)

Mail System Delivers Hard Copy Of Messages via Desktop Printers

ATLANTA — Amtel Systems Corp. has introduced an electronic mail system that reportedly delivers hard copies of telephone messages and other communications to up to 2,000 users in a facility via desktop printing terminals.

The Messenger II may be incorporated directly into building wiring, telephone cable or the dial-up network. In addition, it may also be tied to such external networks as TWX, Telex and direct distance dialing, either originating messages to be sent over such networks or providing immediate delivery of messages received.

The system can handle up to 1,000 call/hour, the vendor said. Incoming calls that are not completed go to a message center where an attendant enters the message into a standard form on a CRT terminal. A paper tape containing the printed message immediately appears at the desk of the intended recipient.



The Messenger II creates a local network using existing wiring and also connects with external networks.

If an important call comes in for a person already on the phone, the attendant can send a "party holding" message. An option allows the recipient to

push a button indicating whether he wishes to accept the new call or have a message taken for later call-back.

The Messenger II system is composed of a Central Equipment Group (CEG) and printing desktop terminals. The CEG includes a CPU with a 14-in, 18M-byte Winchester disk drive, interfaces to other data sources and one CRT terminal each for message entry and directory management.

The CEG costs \$29,950 and the printing terminals that deliver messages — but do not allow response or message origination — cost \$550 each, Amtel said from 1293 Anvilwood Ave., Sunnyvale, Calif. 94086.

lity, the lower end OIS series can reportedly now support such optional software packages as list processing, for maintaining customized lists that can be selectively retrieved and printed in a number of formats; and the readability index, for gauging the complexity of prose. Basic is also an option.

Software is available at no charge and includes math, sort, system security, super global replace, automatic paragraph numbering with a table of contents generator, document merge, format modification and an index generator.

Wang is located at One Industrial Ave., Lowell, Mass. 01851.

DEC Extends Support for Decmate

MERRIMACK, N.H. — Digital Equipment Corp. has unveiled an enhanced version of its word processing software, several systems options, pedestal packaging and four applications packages for Decmate, its stand-alone, small business system that features DP and word processing capabilities.

Version 2.0 of the Decmate software adds to the Version 1.0 global search and replace, double-density floppy storage, go-to-page, automatic pagination, wide-ruler support and optional math.

Global search and replace al-

lows users to search in a forward direction for a phrase and replace it with another phrase from the paste buffer. Search phrase length can be up to 50 char. or spaces.

The double-density diskettes increase the storage capacity of the diskettes by 50% and will accommodate approximately 175 pages of text. Documents previously created on single-density diskettes can be used on Version 2.0 without conversion.

With go-to-page, users can go to a specific page number within a document or move a specific number of pages at one time

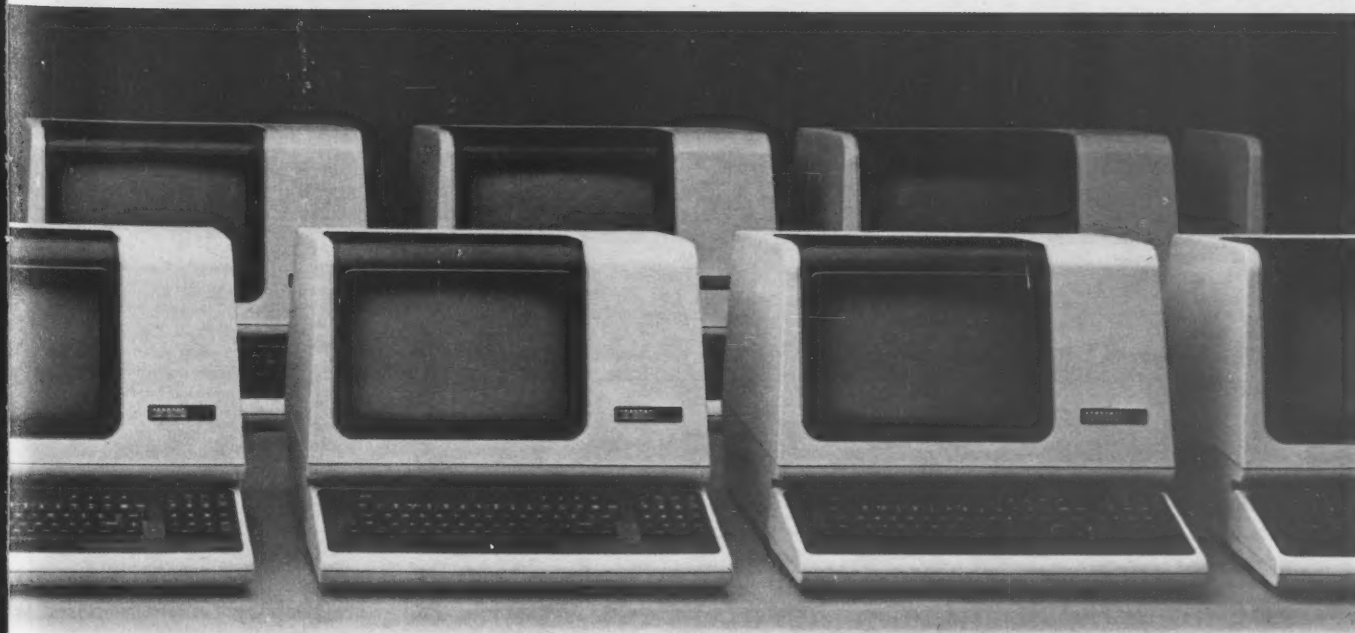
either forward or backward. With automatic pagination, one command is all that is necessary to paginate an entire document automatically. Wide-ruler support allows users to create documents with up to 158 char. on a line.

There are two math features. Editor math is used to create and maintain numerical tables within a document and can be used to calculate column totals, subtotals and column averages. List-processing math works with the list-processing software to perform calculation

(Continued on Page 54)



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**We change the way
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Line Managers Seen Driving Demand for OA

(Continued from Page 51) son asserted. DEC, for example, has the Office Information Systems Department, which Erickson runs.

Moreover, the "backbone" for internal communications at an organization — including links to data center mainframes — must be developed and implemented at the corporate level. This backbone is necessary for office systems in various departments

to exchange data of common interest.

Corporate office systems departments are "facilitators," coordinating office systems functions at a number of departments in the organization, but not hoarding expertise and authority in a fashion comparable to corporate DP departments, Erickson indicated.

Whether or not corporate

administration of office automation should be subsumed by the corporate DP or Management Information Sys-

tems Department is a question too difficult to answer right now, he said. More experience with office systems

is necessary before general models of how to structure their management can have much credence.

Decmate Gains Enhancements

(Continued from Page 51) based on the information in list documents and inserts the answers in output documents.

Version 2.0 of the Decmate

WP software costs \$500. Optional math and list-processing packages cost \$400 each. The sort package costs \$300 and the communications package \$150. The entire

package is available for \$1,550.

In addition, the printer switch costs \$235, and the two-channel communications port costs \$900.

The customer-installable systems pedestal houses Decmate's diskette drives in both dual and quad configurations. The price for the dual-drive configuration which includes the pedestal and two RX02 floppy diskette drives is \$4,375. The pedestal and four drives cost \$8,525.

The four applications packages include a job-applicant tracking system (\$300), executive office management system (\$250), Smart Mailer, a direct mail package (\$250) and a release of financial modeling software that allows users to merge financial modeling with WP (\$250).

DEC is located in Maynard, Mass. 01754.

WP Package Fits Level 6, DPS-6

FOUNTAIN VALLEY, Calif. — A word processing software package for Honeywell, Inc. Level 6 and DPS-6 computers is available from Hoberg & Associates, Inc.

WP400 is designed to function under the Gcos MOD200 and MOD400 operating systems. WP400 features compatibility with a number of inexpensive CRT terminals and printers and minimal overhead CPU requirements.

The package costs \$3,000 from the vendor at 16901 Mt. Hope St., Fountain Valley, Calif. 92708.

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Want to Sell to China? Country Now Willing to Buy

By Carol L. Covin

Special to CW

The message to foreign companies that wish to export to China was clearly stated on a recent visit to the People's Republic of China: China will buy from those companies willing to cooperate with the Chinese in maintenance of the hardware, development of the software and transfer of technical knowledge.

The Chinese have learned several lessons in the last few years. They cannot develop a modern data processing industry alone. Neither can they expect to import foreign technology wholesale to transform their industry. Their current position represents a cautious approach to improving foreign technology to supplement their own skills.

At this time, the Chinese data processing industry is very uneven. Extensive technical knowledge demonstrated by a few high-level professionals tends to mask substantial inexperience in the practical use of comput-

ers. Paper tape input devices often sit side by side with terminals. The concept of data base management systems (DBMS) will only be discussed by a few of their high-level people, yet users are trying to link microcomputers in a distributed network.

I recently visited the People's Republic of China as part of a 12-member computer science delegation. Members of the group had been chosen for their widely varying backgrounds in an attempt to present a cross-section of the U.S. computer industry.

The trip proved to be both exciting and frustrating. It was exciting in that it revealed the direction of the data processing industry in China today; it was frustrating insofar as we were unable to convey all we had hoped to about the data processing industry in the U.S.

Three specific areas in which the Chinese are now concentrating are:

- Minicomputers and mi-

(Continued on Page 56)

Centronics to Purchase CDC-NCR-ICL Venture

By Marcia Blumenthal

CW Staff

HUDSON, N.H. — Centronics Data Computer Corp., a printer maker that has suffered heavy financial losses during the past year and a half, has agreed in principle to acquire the assets of a printer manufacturer jointly owned by three mainframe makers. One of those mainframes, Control Data Corp., has additionally agreed to invest \$25 million in Centronics.

Under the proposed acquisition arrangement, which would be made through an exchange of stock, Centronics would acquire the printer business of Computer Peripherals, Inc. (CPI), a manufacturing and technology venture jointly owned by CDC, NCR Corp. and the UK's International Computers Ltd. (ICL).

For its \$25 million investment in Centronics, CDC would gain a 35.5% ownership interest in the firm, which until now has specialized in low-end dot matrix printers. NCR and ICL would each own 4.7% of Centronics after the stock transfer. The arrangement calls for Cen-

tronics to issue 4.5 million new shares of common stock.

CPI currently has no dedicated marketing force. Instead, it produces high-end printers and sells them to its three owners as well as performing research and development for new products.

CPI has assets of \$28 million; its revenues are estimated in the \$65 million range. The firm's 925 manufacturing and research personnel will be folded into the Centronics operation.

Sales Force Expansion

The addition of a full line of computer printers will necessitate the expansion of Centronics' sales force, its president, John Tincler said.

The \$25 million in cash from CDC will permit Centronics to significantly reduce its debt-to-equity ratio, according to Tincler, who added that the company has been working out new lending agreements with its bankers for the past several months. In its last fiscal year ended June 30, Centronics posted a \$24.5 million loss on revenues of \$123 million.

In addition to restructuring its debt, Centronics will name a new chairman and chief executive to replace Robert Howard, the firm's founder and current chairman and chief executive. CDC is expected to have a significant say in the selection of a new chief because the arrangement calls for CDC to have three members on Centronics' nine-member board.

Thomas Kamp, president of CDC's Peripherals Products Division, is expected to become the chief executive of Centronics if the deal is approved.

The proposed arrangement must be approved by the boards of CDC, NCR and ICL and the board and shareholders of Centronics.

Sales to Hit \$3 Billion in '86

Unix Demand Seen Skyrocketing

By Robert Batt

CW West Coast Bureau

SAN FRANCISCO — There will be an enormous increase in the demand for Bell Laboratories' Unix operating system over the next five years, with sales in 1986 totaling \$3 billion, a software conference here was told.

Between 1980 and 1981, the number of Unix systems installed increased by 65%, and the number of source licenses rose 106%, Beverly Josephs, product marketing manager for

BBN Computer Corp., told the recent UNI-OPS conference here.

Between October and December of last year, Josephs said, there had been 100 extra source licenses and 200 extra installations for Unix. "This is what we call job security," Josephs added.

The Cambridge, Mass.-based company estimates that the Unix marketplace will grow from \$133 million in 1980 to \$362 million this year. "Our estimates put the marketplace

value at \$3 billion by 1986," Josephs noted.

Josephs asserted that the price difference between Unix and other operating systems is becoming less significant as system prices decline over time. For example, a typical system in 1980 could cost as much as \$100,000. This has now dropped to around \$5,000. "Unix is the insurance users need in terms of programmable productivity," she claimed.

At present, the market is pre-

(Continued on Page 56)

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Boom in Unix Sales Seen in Next Five Years

(Continued from Page 55)
dominantly end-user-oriented, although a greater OEM presence is expected in the years ahead. Josephs estimated the current market split as 44% commercial applications and 56% academic.

"Software rather than hardware dominates the use of the system commercially and we expect this market for Unix-based machines to grow very rapidly over the next few years," she said.

Although the software business in the Unix arena is the least net-asset-oriented, BBN Computers expect the software element to grow approximately 35% a year over the next five years.

Within the commercial market, large companies are the main users of Unix. Applications include general and business accounting and word processing. Unix is often utilized as part of a large distributed data processing network.

Other users include universities and technical schools,

government agencies, OEMs and software houses. "We have found a large part of the government sector is interested in office automation and Unix is being used in offices with systems such as electronic mail," Josephs said.

Support for Unix?

In another presentation to the conference on market forecasts for Unix, Jean Yates of Gnostic Concepts, Inc., a Menlo Park, Calif.-based market research firm, said a big factor would be whether Digital Equipment Corp. will support Unix.

"If DEC supports Unix, it helps to legitimize the product and will open up the market even further. In addition, it will make it much more difficult for vendors to sell against DEC equipment," Yates said. "If DEC supplies it, it will be a big shot in the arm for Unix because it will mean a lot of Unix users can sign up to whatever level DEC decides

to support."

Yates claimed that Unix is the system around which small business system vendors are rallying. IBM, she said, is giving its stamp of approval to Unix as the OS for its Series/1 minicomputers and has signed a contract to use the University of Ohio port.

"Everyone is looking for an upgrade path, and if users perceive they can buy a personal computer and use the same operating system in updating as far as the IBM 370 series, its going to be very attractive," she added.

Yates claimed that in Japan,

everyone is looking at the Unix system as a key to getting into the U.S. business market. "By 1985, it may be so inexpensive to run an operating system on a terminal that most users will turn to Unix," she said.

Citing some figures different than Josephs', Yates said an estimated 3,000 sites are using Unix in the Bell system alone. Research and university institutions possess 1720 systems, the Government and military 270 sites and the commercial world 4,000 sites.

According to Yates, one of the major problems is setting

up a port for the Unix system. This requires a programmer to combine expertise in the Unix system with microprocessor expertise. "This is what is required to produce a really clean port and it is a particular combination of skills that is not easy to find," she said.

Application software compatibility is a big problem for users who want to make sure they can put their applications on the largest number of machines possible. Yates claimed that in terms of support, Zilog, Inc., with its Zeus Unix system is the most advanced.

China Willing to Import DP

(Continued from Page 55)
crocomputers.

- Applications software packages.
- Marketing of computer services.

The Chinese are now using their limited capital to put minicomputers and micro-

computers into the hands of a large number of users. Both Chinese-made and foreign imports are being used. Concentrating on minis and micros not only extends the value of their capital investment, it exposes more people to hands-on training on the computers. This leads to the second area of concentration: applications software packages.

Technician Shortage

In China today, there are 1,000 software technicians; 1,000 software developers, analysts and programmers in a country of approximately one billion people. This has led the Chinese to investigate the use of applications software packages. They are interested in general-purpose software such as DBMS, as well as specific application packages for such things as manufacturing and inventory control and hotel management.

While recognizing the potential value of these packages, both in circumventing their critical shortage of software technicians and in extending computer power to end users, they are still in the very early stages of investigation in this area. The Chinese did, however, accept a proposal for a trade fair to demonstrate applications software on minicomputers and microcomputers [CW, Sept. 28].

Finally, the Chinese are trying to identify their own internal markets for computer services. In an effort that parallels their development of computer manufacturing facilities, they are trying to discover who can benefit from computers and how to interest those organizations in using them.

Success in penetrating the Chinese market in data processing will depend on one thing: technical cooperation. To the Chinese this means a broad exchange of technical

information with the companies with which they deal — information such as training, translation of technical manuals and some degree of participation in software development.

The Chinese seem to be most receptive to companies willing to establish training centers in China. These centers would serve the dual purpose of servicing machines and training the Chinese in their use. Japan's Hitachi Corp. has already opened one such center.

Software purchases will also be negotiated with heavy training requirements. The translation of technical manuals into Chinese will be a large factor. The Chinese, for their part, see installation and implementation of software as an opportunity to provide junior-level technicians to work with western senior-level technicians.

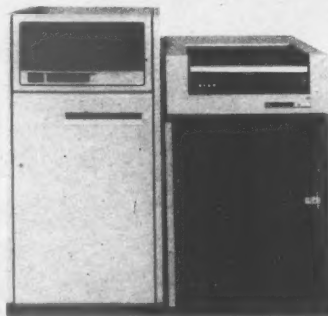
The Chinese will be tough negotiators. What they lack in practical experience with computers they make up for in many ways with awareness of state-of-the-art technology. They are determined to catch up with western technology by the turn of the century and they know they will not reach this goal without careful planning and judicious use of scarce resources — in this case, capital for foreign imports and trained computer technicians.

Covin is an independent consultant specializing in DBMS and evaluation. She is based in Falls Church, Va.

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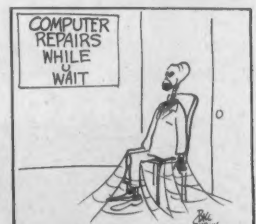
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At Annual Meeting

DG President Details Three-Pronged Strategy

By Jim Bartimo
CW Staff

BOSTON — Structural reorganization is part of a three-pronged effort to prepare Data General Corp. for the coming decade, Edson D. de Castro, president of DG, said at the company's annual meeting here on Jan. 19. "We have restructured Data General for the first time since the company's founding 13 years ago," he noted.

The changes in structure, products and management come on the heels of a year in which the company saw earnings decrease by 25%. While revenues were up 13%, the operating margin dipped to 11% from last year's 16%.

First-quarter revenues increased 18% over 1980's first quarter, but the operating margin hit 10.6% compared to 13% in the year-ago quarter. At last year's annual meeting, de Castro had termed 13% unsatisfactory.

The company president blamed, as he did last year, the country's economic condition for DG's operating results. "High interest rates, inflation and a strong U.S. dollar abroad [which reduced profits from international sales] had an impact on our performance," he said.

However, unlike other companies, DG will not lay off any personnel this year, de Castro said.

One of the reasons for re-vamping DG's internal structure was internal motivation, the chairman said. "We wanted to decentralize the



CW Photo by J. Bartimo
Edson de Castro

operations of a company that is becoming increasingly large and diverse," he explained.

"We wanted to preserve the spirit of achievement that comes to most people from working in small groups while building an effectively controlled larger enterprise."

DG's growing pains came up again in discussing management changes. Some of DG's management team, seeking the atmosphere of the company's early years, have left to join smaller up-and-coming firms. De Castro said he has drawn professionals from IBM, Digital Equipment Corp. and Exxon Co., among others, to fill DG's management needs.

Finally, in the area of products, de Castro reviewed 1981's introductions of new equipment to the market. "Data General entered two high-growth markets — very small business computers

and office automation — and reinforced its position in another fast growing area — large 32-bit systems," he said.

The Eclipse MV/6000, introduced last fall, is an extended-down version of the MV/8000 32-bit computer. De Castro cited industry studies indicating that 40% of all small computers shipped worldwide would use 32-bit architecture.

When asked why Digital Equipment Corp.'s annual figures were not as discouraging as DG's, de Castro said that DG should have entered the 32-bit computer market sooner than it did, because it is this product line that is keeping DEC in such good shape. "We started late with the MV/8000," he admitted, but noted that "our other major competitor, Hewlett-Packard Co., has not come out with one yet, so I guess we're somewhere in the middle."

Enterprise Series

De Castro termed DG's very small computer, the Enterprise series, a seeding product for new small business customers who will need a migration path to larger systems. He expects this product line to have little impact on the company's revenues or profits during 1982 and 1983.

On display outside the meeting room were terminals from the Comprehensive Electronic Office (CEO) concept that is DG's entrance into office automation. "We have combined automated office processes with existing

Quarter Earnings Up

WESTBORO, Mass. — For its first quarter ended Dec. 19, 1981, Data General Corp. reported earnings of \$14.9 million or \$1.40 per share, compared with earnings of \$13.8 million or \$1.29 per share in the year-ago period.

However, income before an extraordinary gain of \$4.8 million from the sale of securities totaled \$10.1 million or 95 cents per share. In last year's first quarter, the company had realized an extraordinary gain of \$5.1 million, also from the sale of securities.

Operating income was \$19.4 million for this period or 10.6% of revenues, compared to \$20.5 million or 13.1% of revenues for the same period last year. Revenues for the quarter were \$183.5 million, up 18% from last year's \$156 million for that period.

distributed data processing capabilities to supply integrated information management," he said of the new line.

De Castro also mentioned DG's interactive systems software for administrative and scientific applications as one product area that has achieved superiority in the industry in 1981.

On a more promising note, it was pointed out that the company's legal fees would be less in the coming year because the U.S. District Court of the Northern District of California dismissed the antitrust case that Fairchild Camera and Instrument Corp. and Digidyne Corp. had filed. The hiring of five law firms to handle this case cost DG \$5 million last year and sapped 1% of the company's revenues.

An appeal by Fairchild and Digidyne could take one or

two years to materialize, DG's legal counsel said.

There is slow growth ahead in the data processing field, according to de Castro, who therefore called the outlook for the coming year uncertain. While DG's 32-bit line is doing well, it is not doing well enough to offset declining orders in traditional lines, he said.

To stimulate growth, DG has invested heavily in research and development and in marketing, sales and promotion, de Castro said. Improvements in customer service have also been made, he said.

While last year de Castro could not guarantee DG's return to its historic growth rates and operating margins, this year he could foresee an eventual return to it. "Although it does not appear imminent, we are working to make it happen."

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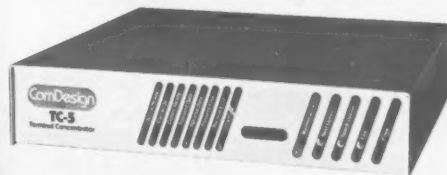
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Gene Amdahl Claims IBM's Lead Gone, Spark Lost

By Jeffrey Beeler

CW West Coast Bureau
SAN FRANCISCO — IBM lost its technological supremacy years ago and much of that former leadership has never been recaptured, according to Amdahl Corp. founder Dr. Gene Amdahl.

"Some kind of spark has been lost [at IBM], and it's kind of a shame because the industry is entering a new era" characterized by intensified competition from Japan and other relative newcomers to the mainframe field, Amdahl said at a recent meeting of the Association

for Systems Management.

IBM no longer enjoys the dominant position it held during the late 1960s, when the federal government filed an antitrust suit accusing the industry giant of monopolizing the general-purpose computer field. The slippage in IBM's market leadership during the last 12 years explains at least partly why the suit against the company was recently dropped, Amdahl said.

While IBM's star in the mainframe firmament has been gradually sinking, Japan's has been steadily ris-

ing. The Japanese are moving "very strongly" into the large-scale CPU sector, where they intend eventually to gain an "ascendant position," Amdahl said.

The strategy behind Japan's planned industry takeover began to take shape last year when participants from around the world gathered at a Japanese-sponsored conference dealing with fifth-generation processors, which will rely heavily on artificial intelligence. Amdahl, who recently left the company that bears his name to form another IBM-compatible mainframe supplier called Trilogy Systems Corp., sees last year's conference as the first step in a long-term Japanese plan to win acceptance

for a new world architecture that might eventually replace IBM's.

Discussions of fifth-generation CPU architecture herald an "interesting [computer industry] shoot-out" between IBM and Japan, Amdahl predicted. "I'm not sure yet who will win the shoot-out."

In the semiconductor business, Japanese firms have already gained the upper hand over their American counterparts. "Japan has the advantage, not just in the memory sector, but in every area," Amdahl said.

Amdahl attributed Japan's technological edge to a widespread tendency among the country's citizens to subordinate their own personal interests to the needs of the na-

tion as a whole. Although lack of individuality has made the Japanese less innovative and independent-minded than their U.S. rivals, Japan has more than compensated for its inherent shortcomings by outdoing American vendors in the thoroughness of their planning and analysis.

Amdahl downplayed the seriousness of AT&T's threat to IBM's current market dominance. Despite its technical competence, Bell lacks IBM's experience in competitive marketplaces.

"I think there's a big difference in mind set between a regulated monopoly and a company that has a long history of having lots of competitors," Amdahl said.

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Supershots

Motorola, Inc. has created two new operating groups called the Government Electronics Group and the Information Systems Group. Heading these groups will be two newly appointed vice-presidents, James Lincione and Arthur Carr, respectively.

General Datacomm Industries, Inc. has formed a Network Sales Group to serve the applications needs of customers with large data communications networks.

General Electric Co. and Structural Dynamics Research Corp. have joined forces to form General Electric CAE International, Inc., a supplier of computer-aided engineering software products.

Dicomex Corp. has consolidated its marketing and sales functions and established a new department of customer operations.

NBI, Inc. has established an Office of Corporate Strategies and consolidated all operating groups into the Operations and Field Operations divisions.

Datasab AB, the Swedish firm, is now known as Ericsson Information Systems AB.

Management Information Corp. has opened a publication and service office in the UK at 60 Belmont Road, Hasting, East Sussex, TN35 5NR.

Oratech, Inc. has opened a sales and service office in the U.S. at 2850 Ocean Park Blvd., Santa Monica, Calif. 90405.

Harper & Row has signed a

nonexclusive agreement with Apple Computer, Inc. to jointly research the college and high school markets for computer software and to jointly market microcomputer programs developed by Harper & Row. Harper intends to make its products available in Apple format, and in return, Apple will

provide technical support and consultation, product review and access to its dealer network.

Canada Systems Group has been appointed exclusive Canadian distributor for the Applicon computer-aided design systems manufactured by Applicon, Inc.

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IBMer Sees Fast Pace of Innovation Continuing

By Jeffrey Beeler

CW West Coast Bureau

SAN DIEGO — How long will the computer industry's breakneck pace of technological innovation last? Will exponential improvements in hardware price/performance continue indefinitely?

Or, as some industry critics fear, will technology soon encounter insuperable barriers that will slow its runaway growth to a sedate stroll?

On the subject of whether technology will continue to advance rapidly, some observers are pessimists, while others, like Gale Aguilar, director of marketing and service programs for IBM's General Products Division (GPD) based in San Jose, Calif., are confirmed optimists.

"In the areas of disk storage, printers and CPUs, I don't foresee any slowing down in the technological progress that has characterized the computer industry during the last 20 years."

In fact, he predicted, the pace of technological development may even accelerate, at least through the rest of the 1980s.

Aguilar made his comments at the annual meeting of the Joint Associations of San Diego, whose member organizations include the local chapters of two dozen nationwide professional societies.

Although the last two decades have brought a 100-fold reduction in the cost of disk/file storage, the technological potential of rotating disk memory is by no means exhausted. By the end of the 1980s, in fact, the cost of

maintaining data files on magnetic disks will probably drop again by an order of magnitude, Aguilar said.

Comparable Advances

Comparable advances will also take place in other sectors of the storage/technology field. Using relatively recent innovations like magnetic-bubble memories, for example, systems will someday be able to record up to a

million bits on a single 1-sq in. chip, the IBM marketing executive said.

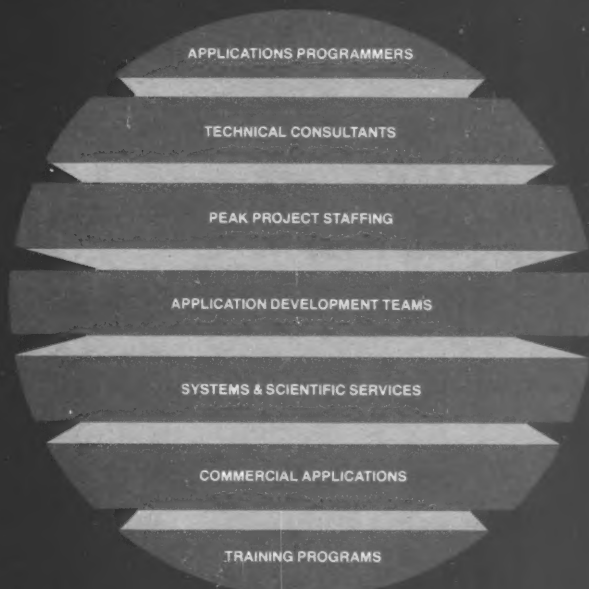
For many years, he added, the computer industry has stressed the optimization of systems performance above practically all other DP-related concerns. But now, the emphasis in industry thinking is slowly beginning to shift, with companies increasingly focusing their attention on the problem of

how to adapt information processing systems to their users' needs.

In their efforts to make systems as easy to use and non-threatening as possible, vendors no doubt will draw heavily on advanced technological disciplines like artificial intelligence, which will eventually have an impact on almost every computing interest imaginable. "Artificial intelligence will play an

important role in adapting systems to their users," Aguilar said. "It will allow the interface between human and computer to be moved back out to the user rather than being placed in the system itself."

Aguilar described the early 1980s as the beginning of a new era during which users will increasingly demand the ability to interact flexibly with their systems.



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NAC Merged Into New Firm

NEW YORK — Network Analysis Corp. (NAC) of Great Neck, N.Y., a subsidiary of Continental Telephone Co., and International Computing Co. of Bethesda, Md., have merged into a new company named Contel Information Systems, Inc., it was announced here recently.

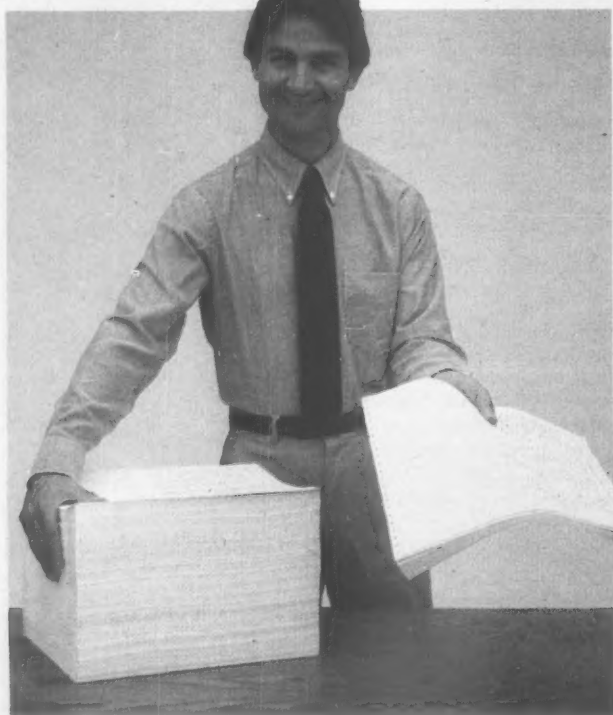
Contel's president is Howard Frank, who headed NAC. Issac D. Nehama, who was president of International Computing, is executive vice-president and chief operating officer of the new organization.

Contel, a subsidiary of Continental Telephone Co., will provide network design consultation services, build customized software for real-time telecommunications and data processing applications and design and implement local-area networks for civilian and government clients.

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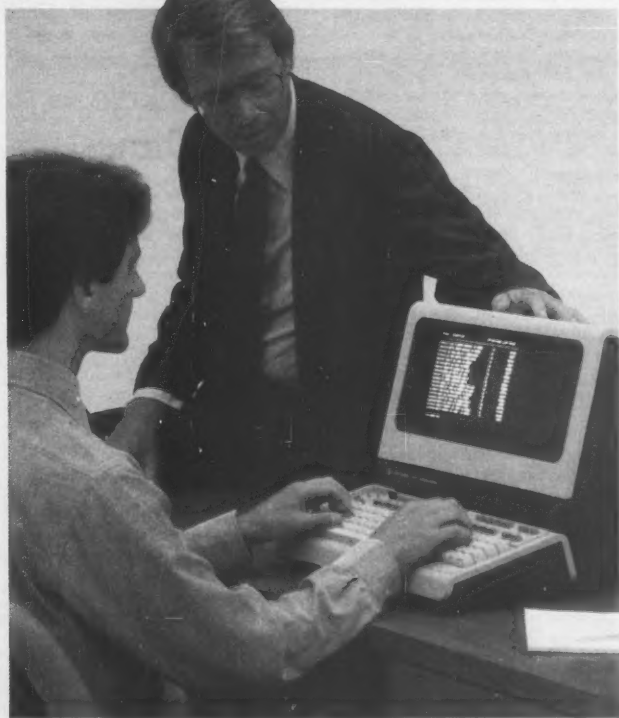


RAPID/3000 takes advantage of a "data dictionary" that not only indexes and cross-references your data as it is entered (and checks it for accuracy), but also provides relational access and keeps track of how that information is to be used. Your staff is free to tell the computer what they want, without worrying about how they're supposed to get it. And the same software also makes it easy for *you*. A few simple keystrokes is all it takes to call up the precise information you need. Whenever you need it.

More Out.

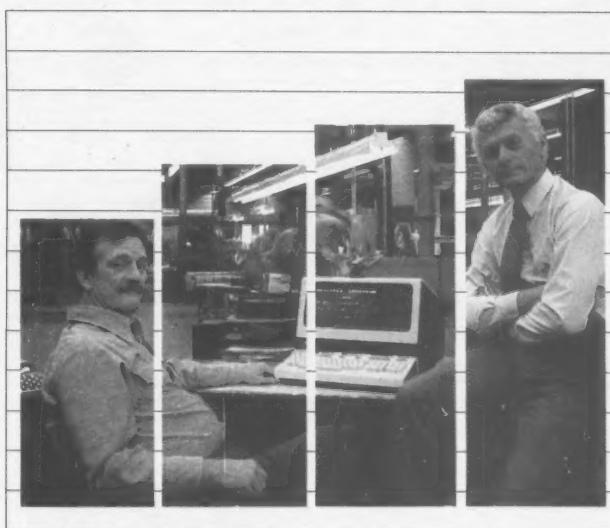
get out of them. We call it RAPID/3000, and it runs on our entire family of HP 3000 computers. Basically, it's a "software shortcut"—a set of programming tools to help your applications programmers and analysts do their jobs in a much simpler, quicker way.

Less Risk. More Reliability.



One of the most important benefits of RAPID/3000 is that your programmers can create a model, or prototype, first. So you can see exactly what you're going to get before you get it. If something is not exactly right at this early stage, it's a simple matter for your programmers to change. You don't risk a lot of time and money developing your programs, and your users work with a more reliable system all around.

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LDD Gets FCC Type Acceptance For Radios Developed for DTS

BURLINGTON, Mass. — Local Digital Distribution Co. (LDD), a joint venture of Aetna Life and Casualty Co. and M/A-COM, Inc., has been granted type acceptance from the Federal Communications Commission (FCC) for its Phase I digital radios, developed for digital termination systems (DTS).

These radios will be marketed under the name of Rapac (Radio Packet Communications). The devices reportedly permit local subscribers to

share microwave radio channels for data applications. This technique is said to allow users to avoid traditional telephone company local loops for the transmission of data.

Rapac is the first DTS system to receive type acceptance from the FCC, M/A-Com said. Thirteen firms have submitted applications to the FCC to become DTS common carriers using Rapac.

Initial production shipments of Rapac equipment will begin in August.

Executive Corner

- Charles Mulholland has been promoted to chief executive officer and chairman of the board and Eric Krause has been named president at Dynatech Corp.

- Stephen P. Smith has been elected president and chief operating officer of Relational Systems International Corp.

- Donald E. Peebles has been named president of GTE Data Services, Inc.

- Linda Johnson has been appointed vice-president of administration at Software Distributors.

- Dorothy Langer has been named to the newly created post of vice-president/marketing at the Gartner Group, Inc.

- Stephen W. Trescot has recently been elected senior vice-president of operations at Florida Software Services, Inc., a Kirchman company.

- Richard J. Campbell has joined American Transcommunications, Inc. as vice-president.

- Verney L. Brown, senior vice-president and director of Paradyne Corp., will retire in March. Kenneth R. Wall has joined the company as a corporate officer and vice-president of manufacturing, and John D. Applegate has been promoted to a corporate officer and vice-president, product development.

- Douglas T. Williams has joined the Brokerage Services Division of Automatic Data Processing, Inc. as vice-president of trust services.

- Timothy C. Cronin has been appointed vice-president of product marketing at Software International Corp.

- Scan-Optics, Inc. has appointed Richard C. Thompson vice-president of sales, Atlantic Region.

- Charlie Wilson has been named senior vice-president of manufacturing for Verbatim Corp.

- James Forney has been named to the newly created position of vice-president, applications development and support, at SMC Proprietary Systems Division, a subsidiary of Science Management Corp.

- Octavio Martinez has been appointed a senior vice-president of Intersil, Inc.

- Cray Research, Inc. has named John F. Carlson and G. Stuart Patterson as senior vice-presidents and Peter A. Gregory as vice-president.

- Thomas F. Blaylock has been promoted to vice-president of the Orbitan Division of Data Card Corp.

- William J. Graham has been appointed vice-president of marketing at Micro Data Base Systems, Inc.

- David J. Wertzberger has been promoted to vice-president of marketing and sales at SSM Microcomputer Products, Inc.

- Desmond F. Hudson has been named executive vice-president of Integrated Office Systems, a new division of Northern Telecom, Inc.

- Robert P. Hudson has been promoted to vice-president of contract services at Tri-State Data Services, Inc.

- Lawrence S. Jordan has been appointed vice-president/distributor, operations at Prime Computer, Inc.

Nickels & Dimes

OSM Computer Corp. has just completed its first round of financing totaling more than \$1 million.

\$\$\$

Technalysis Corp. has increased its annual dividend from 23 cents per share to 25 cents per share, to be paid Feb. 5 to shareholders as of Jan. 22.

\$\$\$

Data Switch Corp. has announced a \$2.1-million credit line with Connecticut Bank & Trust Co.

\$\$\$

Timeplex, Inc. was issued a \$9-million, tax exempt, New Jersey Economic Development Authority bond. Timeplex has also completed the previously announced sale of Cermetek, Inc., a former subsidiary, to Cermetek Communications, Inc., a new company based in Sunnyvale, Calif.

\$\$\$

Miniscribe Corp. has completed its second round of private equity placement financing, raising approximately \$2.4 million.

\$\$\$

Fabri-Tek, Inc. has sold more than 1.5 million shares of its common stock at \$6 per share to CTS Corp. CTS intends to acquire the remaining two plus million outstanding shares as well.

\$\$\$

Anacomp, Inc. has filed with the Securities and Exchange Commission a \$40-million offering of convertible subordinated debentures due in the year 2002.

\$\$\$

Omegacorp. has raised \$8 million in its third round of private capital investment. Funds will be used to meet anticipated production demands for its Alpha-10 removable-media 10M-byte disk drive.

Neglect of Services Seen Skewing U.S. Policies

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — National economic and trade policies are seriously skewed by a failure to appreciate the importance of service industries, including data processing and telecommunications, according to James D. Robinson III, chairman of American Express Co.

"We are in danger of addressing — inadequately — economic problems of the 1980s with assumptions and perceptions of decades past," Robinson said in a recent speech here to the National Press Club.

According to the American Express chief executive, "our tax laws, our employment and training programs,

our economic policies, our plans to improve productivity simply don't take adequate account of the service industries, of their importance ... and of their unique characteristics."

Robinson's remarks were part of a steadily growing lobbying effort by various service industries, including data processing, telecommunications, banking, insurance and transportation, to raise the visibility of the service sector in government policymaking. Their efforts have already resulted in a White House commitment to foster service industries and in a number of bills in Congress to promote the service sector and address its needs in international trade.

Sounding "a loud and determined

alert" to the importance of services in U.S. economy and trade, Robinson produced figures showing that in 1979 services constituted 66% of the U.S. gross national product and provided jobs for seven of every 10 American workers.

In addition, he said services account for 20% of all world trade, with U.S. service exports amounting to at least \$60 billion in 1981.

Noting that "the technological revolution requires legions of highly educated, trained and sophisticated employees," Robinson said job growth in the service sector is twice that of employment in manufacturing.

Implications Need Studying

Despite those impressive statistics, Robinson said, "we are not acting at present as if we fully understand what services can mean to our domestic economy and our international trade. We have not fully grasped the implications of this profound shift in the way we measure, record, evaluate and manage our economic health."

He further suggested that "outmoded and inappropriate" economic indicators and assumptions about mon-

etary policy are causing problems for government policymaking because they "are based on an industrial economy rather than a service-dominated economy."

U.S. trade policy, he continued, has been targeted on promoting export of manufactured goods, ignoring the growing barriers — both visible and invisible — to services trade.

Robinson mentioned the "potentially threatening and disruptive barrier" of transborder data flow restrictions. Rapid international data transfers are "vital to businesses, domestic and foreign," he said.

To better address the problems facing U.S. service industries, Robinson suggested:

- Raising the issues of services and trade in services to higher public visibility.
- Ensuring that U.S. laws take full account of the service sector's importance to the domestic economy.
- Reforming international trade legislation to give U.S. trade officials sufficient authority to "confront discrimination against our service industries abroad."
- Pursuing "serious negotiations aimed at free and fair trade in services."

New Companies

Colorado Micro Consulting has been established at Suite 204, 3385 S. Bannock, Englewood, Colo. 80110. It specializes in accounting, property management, word processing and inventory software for microcomputers.

Interactive Graphics Services Corp. is a joint venture company of

the Everett I. Brown Co. and the Mid-States Engineering Co. The company will combine traditional architectural and engineering services with the ability to handle graphics and non-graphics information needed for the design of a building. It is located at 1479 Chain Bridge Road, McLean, Va. 22101.

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FACT # 2 RSE customers use the finest equipment available — multiple DEC® VAX™ — 11/780 computer systems.
RSE operates the best equipped VAX™ timesharing installation in the country and you have access to all its resources; including the Britton-Lee Intelligent Data Base Machine™, the DEC® floating point processor and the more than 1.8 gigabytes of disk storage.

FACT # 3 RSE users have non-stop, never-down reliability.
Our intelligent port selector provides you with instant access to multiple central processing units, each having access to a number of multi-ported disk drives. All systems are backed by an uninterruptible power system to keep your data processing on-line 24 hours per day — eliminating down time completely.

FACT # 4 RSE customers have dual nationwide accessibility with both Tymnet® and Telenet™ communication networks.
Both networks are available to all of our timesharing users, with links to every major U.S. community. All timesharing customers are only a local phone call away. In addition, RSE is happy to install a dedicated lease line for customers who need even greater speed and efficiency.

FACT # 5 RSE users have a virtually unlimited software library.
RSE either has in its library, or will purchase any commercially available software package which you may need, at no additional charge.

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FACT # 6 Our customers include many of the Fortune 100 companies.
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Arizona Public Service Company

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You must have 3 plus years' experience installing and maintaining telecommunications systems using VTAM, NCP, CICS and RJE. Strong DOS experience required; VSE preferred. OS, VM experience or the desire to learn is a plus. Your qualifications must include a bachelor's degree; master's preferred. Positive communications skills with users is a must.

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If you are interested, please send your complete resume to: **Personnel Manager, Northwest Regional Data Center, Kaiser Aluminum and Chemical Corporation, P.O. Box 141206, Spokane, Washington 99214.**

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In our recent Survey, which polled more than 50,000 computer professionals, new statistics about compensation differences emerged. Here is a sampling:

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- While length of experience in computing bears a direct relationship to compensation, type of experience is often a more critical factor.
- Some emerging technologies—microcomputer systems, for example—are having an unusual impact on compensation in the field.

Salaries for 45 positions are compared.

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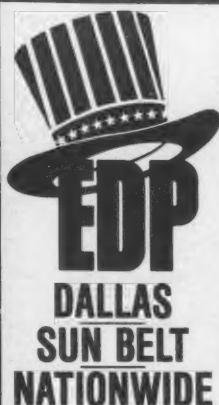
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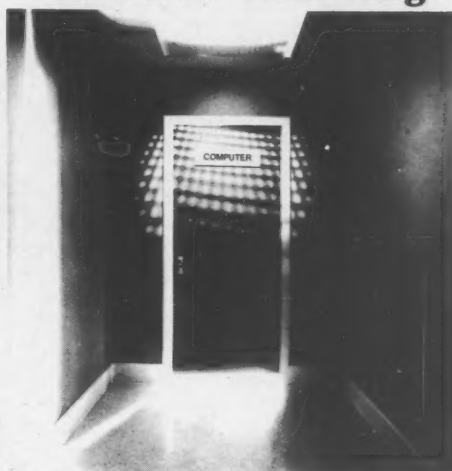
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TEAM LEADER 28-30K Expanding manufacturing firm seeks technically sharp programmer to lead new on-line development project. Sound opportunity for rapid advancement with formal technical and management training. CICS is definite plus. Background in IBM, OS, COBOL and PL/I preferred.	SYSTEMS MANAGER to 40K International financial services firm headquartered in Denver offers the exceptional challenge to an experienced professional. Manage a development group of 15 people in the implementation of leading edge applications. On-line, database systems background required.	SR. SYSTEMS ANALYSTS to 48K Lead the development of major oil and gas systems in the areas of Production Forecasting, Reserve Accounting, Tax Reporting, Regulatory Reporting, Royalty Accounting and others. Receive full top management support and oversee the entire project life cycle. Superior benefit plan and substantial project completion bonuses.	MANUFACTURING ANALYST to 36K Leading suburban Phoenix manufacturing organization seeks Senior individual with extensive background in manufacturing applications development. Position offers total project management responsibilities and occasional travel. Heavy R&D preferred.
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MANAGEMENT SCIENCE ANAL. high 20's Corporate advisory staff of Dallas seeks firm desires professional with linear programming background to provide consulting and operations research services. Suburban location, highly visible position.	PROGRAMMER ANALYST 16-30K Prestigious Denver based oil and gas exploration and production firm seeks qualified COBOL experts for its new IBM 4341 MVS installation. Extensive on-line development; CICS and data base training provided.	PROGRAMMER ANALYST Top 999 Worldwide organization seeks programming professionals who demand compensation proportionate to their contributions. Position demands the highest quality of productivity and receives rewards of superior salaries, excellent working environment and unsurpassed career advancement. Requires heavy COBOL or ALC, OS and exposure to CICS or IMS.	TECHNICAL SUPPORT to 38K Serve as in-house experts in communications and operating systems support for this regional financial institution. Background in CICS, NCP, VTAM, BAL and OS desired. Exceptional merit review program and outside training.
MANAGER OF SOFTWARE low 40's Leading Dallas distribution firm requires a manager to assume responsibilities for all telecommunication and data base software. IMS DB/DC experience preferred. IBM 3033 MVS environment. Direct staff of ten.	TELEPROCESSING ANALYST to 27K Nationally known software firm offers opportunity to consult with wide variety of clients with sophisticated communications requirements. Strong hardware and large scale systems software background required.	CICS PROGRAMMER 20-35K Use your current CICS background and learn distributed processing as you assist a leading manufacturing firm in establishing distributed processing network of data centers throughout the southwest. Career path into either systems software or applications design, the choice is yours.	APPLICATION PROGRAMMERS 15-26K Participate in the full development cycle of major distribution and financial systems software. Work in group of 4-5 professionals with highly rewarding environment. Minimum one year COBOL, ALC or PL/I with preference for exposure to both OS and DBS.
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SYSTEMS ANALYST to 36K High technology manufacturing company requires a creative thinker with a proven track record in application development in a large installation. Company currently upgrading to IBM 3033 and is committed to a database technology.	PROGRAMMERS 15-25K Develop expertise in structured techniques and gain exposure to detail systems design. Advance at your own pace and receive recognition accordingly. Requires solid COBOL; will train in teleprocessing and database concepts.	NEW MVS GROUP to 42K Fortune 500 organization is building a new corporate MVS group in a highly desirable Houston suburb. The group will service multiple operating divisions as well as corporate requirements. Functional areas addressed include manufacturing, purchasing, distribution, general accounting and long range financial planning. Hardware/software environment includes IBM 3033/MVS/IMS/DBA. Tenacity plus professionals are required ranging from Programmers through Project Managers. Extensive in-house vendor training in database and teleprocessing is also offered.	JR. CONSULTANT 18-24K National consulting firm desires computer programmers of analysts who wish to broaden their data processing experience and assist client organizations in the development and implementation of long range information management plans. Prefer backgrounds with multiple language expertise, minicomputers, operations research, or business management.
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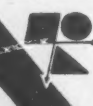
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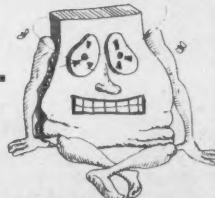
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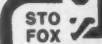
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Director of Computing Services
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University of Arkansas
Fayetteville, AK 72701

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a leader in turnkey factory data
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join our nationwide marketing
and development teams.

The Data Pathing Division of NCR has over 15 years of success in developing industrial Source Data Management Systems. We view the more than 300 systems we've installed for Fortune 1000 companies as only a starting point. This is why we are greatly expanding our marketing and marketing support teams in cities across the country.

Senior Account Managers

If you have three or more years of experience in selling EDP Systems to all levels of management, we offer an opportunity to earn a high income through sales of large systems with an aggressive commission structure. A degree in Business or Engineering, together with a familiarity of manufacturing systems, is highly preferred. Openings presently exist in these locations:

Boston, MA **Milwaukee, WI**
Cincinnati, OH **Pittsburgh, PA**
Dallas, TX **San Jose, CA**
Detroit, MI **Utica, NY**

Working out of these cities, you will be responsible for calling on major manufacturers in a broad geographic area.

Programmer Analysts

If you have a degree in Computer Science or at least three years of programming experience—preferably with on-line systems for manufacturing applications—and want to work with a distributed terminal network minicomputer system to develop on-line, turnkey systems, we have opportunities at Application Development Centers in these cities:

Baltimore, MD **Orlando, FL**
Chicago, IL **Sunnyvale, CA**

Systems Engineers

If you have a degree in Computer Science, Business, Industrial Engineering or related experience and welcome direct customer contact, you may be interested in a position as a Systems Engineer. The openings in the following cities involve project leadership in developing customer application software, the design of real-time and distributed data bases and sales support.

Boston, MA **Louisville, KY**
Chicago, IL **New Orleans, LA**
Cleveland, OH **Pittsburgh, PA**
Dallas, TX **Providence, RI**
Indianapolis, IN

All salaries will be fully commensurate with experience. You will also receive NCR's comprehensive benefits package, including relocation.

For prompt, confidential consideration, please send your resume and salary history to:
Ms. Pamela Anderson,
Data Pathing Division,
NCR Corporation,
Dept. J-55,
Dayton, OH
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We offer competitive starting salaries and paid company benefits. These opportunities exist at our Michoud Assembly Facility located in suburban East New Orleans.

Qualified candidates interested in learning more about these opportunities at Martin Marietta should forward resumes, including salary history to: Martin Marietta Aerospace, Denver Glazier, CW-21, P.O. Box 29304, New Orleans, Louisiana 70189. We are an equal opportunity employer, m/f/h.

MARTIN MARIETTA

Programming

Programmer Analyst

The Corvallis division of Hewlett Packard offers you the opportunity to join an industry leader and live in an attractive, vital university community. We are involved in the design/manufacture of hand-held calculators and the latest personal computational products on the market today. We have an immediate need for experienced Programmer Analysts.

Responsibilities include the design, implementation and maintenance of software on the HP 3000 and AMDAHL 470. You will analyze and solve software related problems. You will also train users and operators on the applications systems.

Qualifications are a bachelors degree or equivalent. Experience or knowledge of data processing, COBOL, BASIC, MARK IV, HP 3000, AMDAHL 470, and JCL is desired. Experience in accounting or marketing programming highly desirable. Must be capable of self-directed work and scheduling of one's own time. Proven analytical ability and design skills desired. Business experience is extremely useful.

We offer a fully competitive salary and outstanding benefits package. If you are qualified and interested, please send your resume in confidence to: Janet Flaherty, Hewlett Packard, 1000 NE Circle Blvd., Corvallis, Oregon 97330. We are an equal opportunity employer m/f.



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An unusual opportunity exists for broad-based information systems professionals to travel extensively throughout Europe in connection with our International Consumer Product Division's strategic plan of standardizing computer hardware and software. Duties will include: new systems implementation, systems conversions, and systems strategic planning.

Professionals at the Project Leader level and Senior Programmer/Analyst level who have hands-on experience in the implementation of new systems and systems packages are needed. Particular attention will be afforded those with IBM System 34/38 (or IBM 4300) background. In-depth manufacturing systems experience will be a definite plus, as well as the ability to speak German.

We are looking for the shirt-sleeve individual who seeks a significant information systems challenge and who desires the cultural experience that a European environment can effect.

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The University of Vermont, located in Burlington, has openings for qualified Systems Analysts and Analyst/Programmers. All applicants must have a Bachelor's Degree, preferably in a scientific or business related discipline. Position requirements range from two to ten years of combined experience in programming and systems analysis in a data processing environment. Senior positions require a heavier concentration of systems analysis. Experience with COBOL and IBM systems is essential. Applicants with expertise in higher education applications, DBMS and online systems are preferred. Salary to \$30K, commensurate with qualifications and experience. Send resume and the names of three professional references by March 1, 1982, to University of Vermont, OMC, 238 Waterman Building, Burlington, Vermont 05405.

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COMPUTER SCIENCE DEPARTMENT: Assistant Professor/Associate Professor: Applications are being accepted for a permanent, tenure track position beginning September, 1982. DUTIES: Teach 12 credits per semester of undergraduate Computer Science courses, beginning through upper level in an applied Computer Science program. A background in FORTRAN, COBOL, and a block structure language is useful, and may also entail curriculum development involving microcomputers, operating systems, or commercial data processing, advising majors, assisting with an internship program, and participating in academic and professional activities. ACADEMIC PREPARATION: Assistant Professor - Masters in Computer Science or related field plus 10 graduate credits. Teaching experience is desirable. Associate Professor - minimum requirements are a Masters in Computer Science or a related field, Ph.D. desirable. The Computer Science Department has an applied non-traditional program. There are currently 9 faculty and 650 majors. Send application to Dr. Gerald M. Burick, Chairman, Computer Science Department, Indiana University of Pennsylvania, Indiana, PA 15705. Application deadline is February 15, 1982. IUP is an Affirmative Action/Equal Opportunity Employer.



Woodbury University

COMPUTER INFORMATION SYSTEMS DEPARTMENT CHAIRMAN

WOODBURY UNIVERSITY, a 96 year old growing independent university in the heart of the dynamic Los Angeles business and financial community seeks a Chairman for a new Computer Information Systems Department within the Business Division. Unparalleled opportunity to design and implement certificate, associate degree, bachelors degree, and masters degree programs with state-of-the-art technology. Expanded computer center soon to be constructed. Teaching experience highly desirable, but outstanding professional experience is key requirement. Masters Degree required. Eleven month work year, immediate opening. Send detailed resume, salary history and requirements, three reference names, and cover letter to: DR. ERNEST BOBEL, Executive Vice President, Woodbury University, 1027 Wilshire Blvd., Los Angeles, CA 90017.

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Programmer/Analyst Colby College

If you have had several years of experience in the design, programming, and maintenance of interactive systems and want an opportunity to apply your best techniques to a variety of challenging projects, consider working at Colby College. We emphasize development of user-friendly, effective, well-documented application systems in C under UNIX using INGRES relational DBMS. A network with two POP-11's, a VAX-11/780, and seventy terminals and micro serves students, faculty, and administration. Participation in system management, system programming, and instruction-related computing is encouraged. Colby is a private, liberal arts, undergraduate college with highly competitive admissions and 1670 students. Its scenic, semi-rural location in central Maine offers skiing, hiking, boating, etc., and is 200 miles from Boston. Salary commensurate with experience; excellent fringe benefits. Before February 15th, 1982, please send letter of application, resume, and a list of three references to:

**Office of Personnel Services
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Growing midwest agri-business firm is seeking a programmer/analyst with 1-3 years experience programming in COBOL and/or NEAT/3. Qualified candidates should be familiar with NCR B3 or VRX operating systems, and should have some experience working with users on application design. Familiarity with BOS/3 is also desirable. Complete benefit program, competitive salary. Send resume and salary expectations to Box CW-A3175, Computerworld, Box 880, Framingham, MA 01701

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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- BUSINESS/INDUSTRY**
- 10 Manufacturer of Computer or DP Hardware/Peripherals
 - 20 DP Service Bureau/Software/Planning/Consulting
 - 30 DP Service Bureau/Software/Planning/Consulting
 - 40 Wholesale/Retail Trade
 - 50 Wholesale/Retail Trade
 - 60 Finance/Insurance/Real Estate
 - 70 Mining/Construction/Perroleum/Refining
 - 80 Business Service (except DP)
 - 90 Government, Federal/State/Local
 - 95 Printing/Publishing/Other Communication Service
 - 96 Other _____
- TITLE/OCCUPATION/FUNCTION**
- 11 VP Assistant
 - 12 VP Assistant
 - 13 Treasurer/Controller/Finance Officer
 - 21 Director/Manager of Operation/Planning
 - 22 Administrative Service
 - 23 Systems Manager/Systems Analyst
 - 31 Manager/Supervisor/Programmer
 - 32 Programmer/Methods Analyst
 - 41 Application Engineer
 - 42 Application Engineer
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SAUDI ARABIA

SYSOEX INTERNATIONAL, INC., a rapidly growing Systems Management Company, now developing innovative multi-technology systems in Saudi Arabia seeks

Training Manager

Manage EDP instructors for Saudi Arabian users. Responsible for management of trainers, involved in instruction of computerized information systems. Based in SAUDI ARABIA. Arabic fluency not required. Degree necessary.

Software Programmers

Positions involve developing and maintaining innovative large-scale IBM TP systems in a distributed EDP environment. Min. 3 yrs. experience with OS/VS1, VM, MVS, CICS, DBMS, TP (RJE and Interactive). Degree required.

We have requirements for Systems Programmers in Cupertino, CA involving travel to Saudi Arabia on a regular basis as well as positions based in Riyadh, Saudia Arabia.

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You will be responsible for helping to maintain our Magnuson M80/43 and peripherals. You must have large scale digital computers CPU maintenance experience. Positions in RIYADH, SAUDI ARABIA.

Programmer Analysts

Positions involve developing and maintaining innovative large-scale IBM TP systems in a distributed EDP environment. Experience with COBOL, general business, applications, OS/VS1, MVS, CICS, DBMS, TP.

Programmer Analysts positions in both Cupertino, CA with regular travel to Saudi Arabia and in Riyadh, Saudia Arabia. Requires degree and min. 5 yrs. experience.

We offer such benefits as medical, life, ADD, disability, profit sharing, 5 day work week, overseas premium. While based in Saudi Arabia, you will additionally receive 30 working days vacation, 15 holidays, free furnished family housing, free children's education, annual return home travel, paid relocation expenses plus eligibility for new liberal tax exclusions just recently passed.

Please send resume, including salary history, to Personnel Department, SYSOEX INTERNATIONAL INC., 10590 N. Tantau Ave., Cupertino, CA 95014. (408) 996-3380.

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PROGRAMMERS

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System Industries

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SAN DIEGO

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This individual will program financial and business systems applications. To qualify, you must have a minimum of 4 years experience in COBOL, JCL, and IBM 3033/370. Manufacturing background is preferred, and IMS on-line and batch experience is highly desirable.

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Find out more about these excellent opportunities in one of the nation's great cities—San Diego. We offer competitive salaries along with life, medical and dental insurance, retirement and savings plans, Federally-insured credit union, paid Christmas shutdown in addition to vacation, and a relocation assistance program. For further information, please call Bob Stamp (COLLECT), or send your resume and salary history to his attention.

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Data Processing

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The right individual must possess a BS degree in business administration, industrial engineering, mathematics or computer science with emphasis in quantitative analysis. Must have knowledge of APL, FORTRAN, or PLI and operations research application packages, such as SAS, SPSS, or PREMIS.

For immediate consideration send resume with salary history to:

Employment Department—137



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Director, University Computer Center, San Diego State University. The Director is responsible for the effective management of the central data processing organization and for the coordination of instructional and administrative computing activities of the campus. Strong leadership traits and a well-developed understanding of the problems and prospects of computing in a university environment are primary requirements of this office. Salary commensurate with qualifications. Letters of application or nominations, along with supporting documentation, should be addressed to: Dr. Frank A. Medeiros, Associate Vice President, for Academic Affairs, San Diego State University, 5300 Campanile Drive, San Diego, CA 92182-0420 The closing date for this position is March 5, 1982. San Diego State University is an Equal Opportunity Affirmative Action Employer.

UCC CAREERS

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UNIVERSITY COMPUTING COMPANY, a leading Remote Computing Services organization, is seeking a data processing professional with a proven track record in management to assume direction of one of the largest Univac based computer centers in the Southwest.

The successful candidate will direct the efforts of systems programming and technical support groups as well as an operations group. This position is also responsible for UCC's proprietary FASBAC interactive timesharing systems implemented on Prime mini computers. Qualifications must include previous experience with interactive and batch computing on large scale Univac systems; background in the remote computing services industry is desired.

UCC offers competitive salaries and numerous fringe benefits including relocation assistance. If you want to join a leader in this field of high technology, please call collect or send your resume, including salary requirements, to:

Matthew J. Roberto
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A growing ITT unit in Palm Coast, FL located near Daytona Beach is seeking a key professional with a BS Degree in Computer Sciences or related field. Position requires six-eight years of IBM systems experience or equivalent. Knowledge of RPGII or COBOL languages a definite plus. Must be able to set up a data center function, have at least two years supervisory experience with emphasis on personnel management, budgets and procurements of necessary hardware/software. Knowledge of physical distribution principles and transportation data applications important. Some travel is required. In addition to excellent salary we offer outstanding benefits. To be considered for this career opportunity please send your resume including recent salary history in confidence to J. Loudis, ITT Transportation Distribution Services, PO Box TDS, Palm Coast, FL 32037

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We offer a state-of-the-art environment that includes an IBM 4341 mainframe running MVS, TSO, CICS and VTAM, clearly defined career paths offering opportunities for advancement, excellent salary, and a benefits package that includes profit sharing and retirement plans and major medical and dental insurance. If you qualify, send resume with salary history or apply to:

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Orlando, Florida 32809

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Dr. Gary A. Thibodeau, VP for Admin.
Search for Director of Computer Center
South Dakota State University
Brookings, South Dakota 57007
Telephone: 605-688-6157
Deadline for all materials is March 3, 1982 or until position has been filled. South Dakota State University is an AA/EEO Employer (Female/Minor).

Computer Science Faculty Rhode Island College

Rhode Island College invites applications for a person to teach all levels of Computer Science courses and to do related scholarly work and research, college and departmental committee work and curriculum development. This is a continuing tenure line position beginning Fall semester 1982. Masters Degree in Computer Science with substantial graduate level course work in Computer Science required. Doctorate in Computer Science and teaching experience preferred. 1982/83 salary range for Assistant Professor-\$10,100 to \$27,253. Starting salary commensurate with education and experience. Attractive fringe benefits package. The filling of this position is contingent upon available funding. Send letter of application with college placement office credentials or resume and three current letters of reference to Office of Personnel Services, Rhode Island College, 600 Mount Pleasant Ave., Providence, RI 02906. Attn: Chair Mathematics Department. Application deadline April 1, 1982. An affirmative action/equal opportunity employer.

SALES

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Ferris State College
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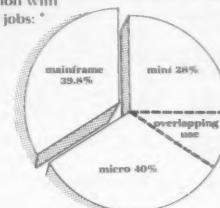
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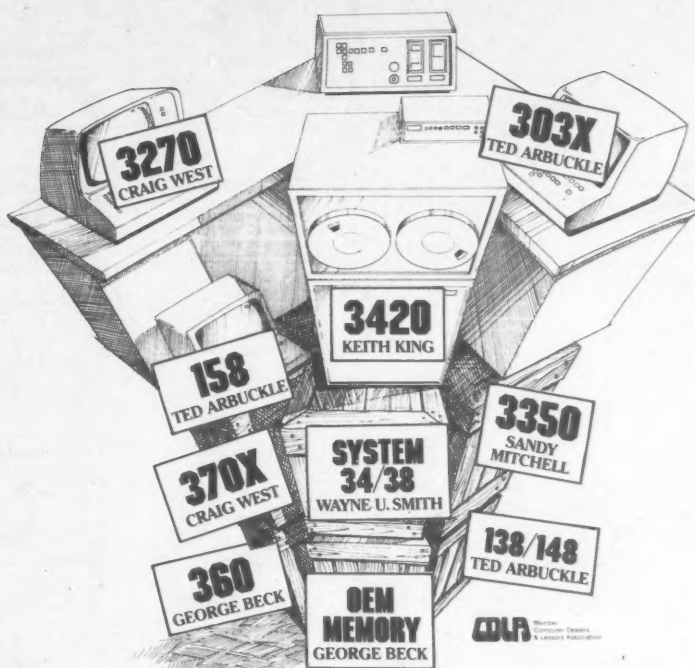
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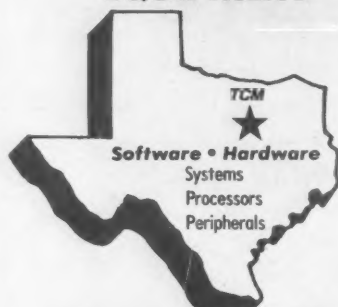
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168 - U32 (2150, 2151, 2152, 3623, 3855, 4650, 6111, 7850, 3066-2, 3067-3, 2860-2, 2870-1, 3-2880's)	lease only	now	
168 - KJ (1435, 3855, 3066-2, 3067-2, 2-2870's, 3-2880's)	lease only	now	
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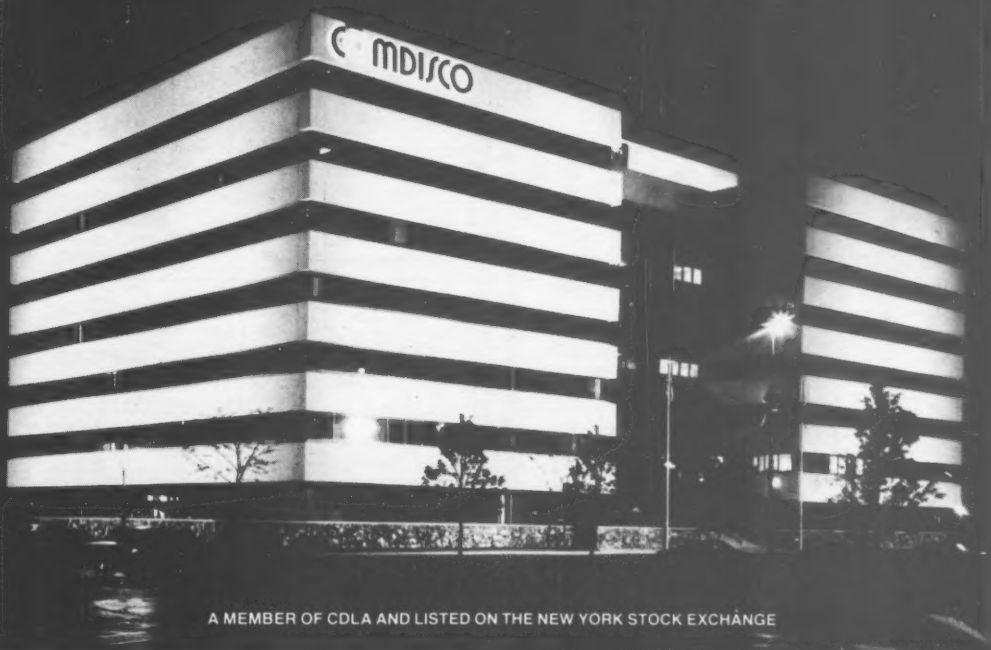
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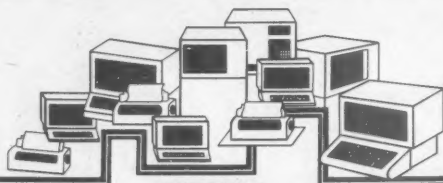
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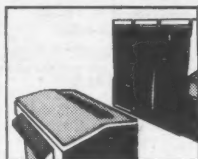


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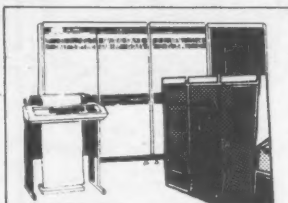
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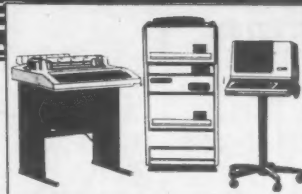
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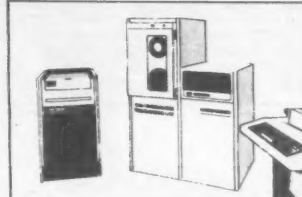


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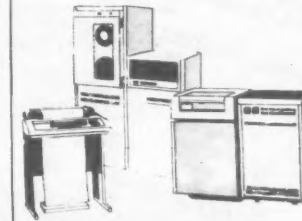


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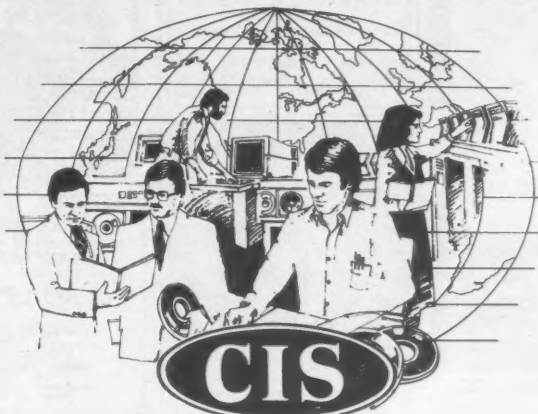
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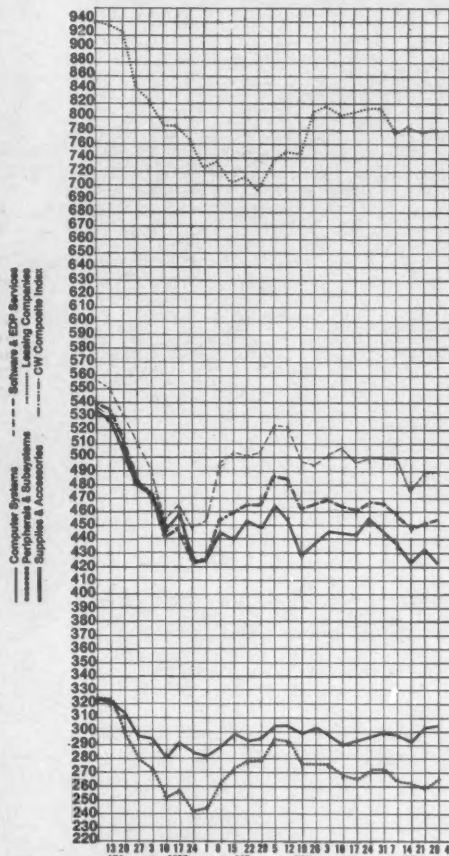
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E X C H	1981-82 RANGE (1)	CLOSE JAN 27 1982	PRICE		E X C H	1981-82 RANGE (1)	CLOSE JAN 27 1982	PRICE		E X C H	1981-82 RANGE (1)	CLOSE JAN 27 1982	PRICE	
			WEEK CHNGE	NET PCT CHNGE				WEEK CHNGE	NET PCT CHNGE				WEEK CHNGE	NET PCT CHNGE
COMPUTER SYSTEMS														
A ANDAHIL CORP	23-48	24 3/4	-1 3/4	-6.6	D ADVANCED COMP TECH	2-8	2 1/4	0	0.0	A COMPUTER CONSOLES	19-28	20 3/8	-3/8	-1.8
N BURROUGHS CORP	28-72	31	-1 5/8	-4.8	D ADVANCED SYSTEMS INC	10-15	13	0	0.0	D COMPUTER TRANSCIVER	3-9	8 1/2	+1 1/4	+23.0
O COMPUTER AUTOMATION	9-28	11 1/4	+1/2	+4.6	D ANACOMP INC	10-18	10 1/4	-1	-8.8	N COMPUTATION SYSTEM	20-48	30 1/4	+1 1/8	+3.8
N CONTROL DATA CORP	18-42	33 1/8	+1 3/4	+5.5	D ANALYSTS INTL CORP	3-14	7 1/2	+1	+15.3	N CONRAC CORP	17-28	24	-7/8	-3.5
N CRAY RESEARCH INC	28-48	34 1/2	-3/4	-2.1	A APPLIED DATA RES.	13-25	21 5/8	+2 3/4	+14.5	A DATA ACCESS SYSTEMS	2-23	3 5/8	+1 7/8	+107.1
N DATA GENERAL CORP	42-87	51	+5/8	+1.2	B ASTRADYNE CORP IND	4-9	4 1/4	0	0.0	A DATAPRODUCTS CORP	19-44	19 7/8	-3/8	-1.8
N DATAPOINT CORP	40-88	46 3/8	-1 1/8	-2.3	N AUTOMATIC DATA PROC	22-32	23 1/4	-1 3/4	-7.0	D DATUM INC	2-5	1 3/4	0	0.0
N DIGITAL EQUIPMENT	80-113	88 1/2	+3	+3.5	D CDA COMPUTER ASSOC	4-25	8	0	0.0	D DAVID JARISON CARLYL	3-6	5 1/2	+1 1/4	+4.7
A EECO INC	7-18	8 1/8	+1/4	+3.1	D COMPUTER HORIZONS	1-5	3	+1/4	+9.0	D DECISION DATA COMPUT	3-6	3 1/2	+1/2	+16.6
N ELECTRONIC ASSOC.	5-13	7 1/4	+1/4	+3.5	D COMPUTER NETWORK	4-8	4 1/2	+1/8	+2.8	D DELTA DATA SYSTEMS	2-4	1 7/8	0	0.0
N FOUR-PHASE SYSTEMS	18-46	38 1/4	+1 3/4	+4.8	D COMPUTER SCIENCES	12-30	14 1/4	-3/4	-5.0	D ERTAN CORP	4-15	6 5/8	0	0.0
N FOXBORO CORP	42-82	51 3/4	-1 5/8	-3.0	D COMPUTER TASK GROUP	10-23	10	-1	-8.0	N ELECTRONIC H & M	3-2	2 3/8	-1/8	-4.1
O FULCRUM CORP GRP	1-3	3/8	0	0.0	D COMPUTER USAGE	2-10	3 7/8	+1/4	+6.8	D EVANS & SUTHERLAND	18-40	25 1/4	-1/4	-0.8
O GENERAL AUTOMATION	6-18	5 7/8	-1/4	-4.0	D CONSERV CORP	8-16	13 1/2	-1/4	-1.8	D FABRI-TEK	2-6	5 7/8	0	0.0
N HARRIS CORP	31-60	32 3/8	-1 7/8	-5.4	O CONSHARE	7-21	7 1/8	0	0.0	D GENERAL COMPUTER SYS	1-12	6 1/2	+1/4	+4.0
N HEMLETT-PACKARD CO	33-54	40 1/4	+1 3/8	+3.5	D CULLINANE DATABASE	15-37	30	+1/4	+0.8	N GEN'L DATA CORP IND	8-19	8 1/2	-1/8	-1.4
N HONEYWELL INC	83-115	70	-2 5/8	-3.8	D DATA DIMENSIONS INC	0-4	1/2	0	0.0	D GENERAL TERMINAL CP	1-4	3/4	+1/8	+20.0
N I&R	48-73	62 5/8	+1 1/8	+1.8	D DATATAB	1-4	1 5/8	0	0.0	N HAZELTINE CORP	18-35	26 1/8	0	0.0
N MAGNUSON COMP SYST	4-32	4 1/4	-3/4	-35.2	D DSI CORP	4-8	4 3/4	-1/4	-5.0	D INFORMATION INTL INC	8-17	11	-1/4	-2.2
N MANAGEMENT ASSIST	9-28	8 7/8	+1/8	+1.2	D DYATRON CORP	3-11	3 3/8	0	0.0					
O MINI-COMPUTER SYST	1-4	1/2	-1/4	-33.3	N ELECTRONIC DATA SYST	15-30	22 7/8	+1/4	+1.1	D INTEL CORP	21-51	26 1/2	+1/2	+15.2
N MODULAR-COMPUTER SYS	7-32	7 3/4	-3/8	-4.6	D INFORMATIONICS INC	10-23	13 3/4	0	0.0	D IPL SYSTEMS INC	6-15	7 1/4	+1/4	+3.8
N MOHAWK DATA SCI	11-32	13	-1/4	-1.8	D INSYTE CORP	1-3	2	0	0.0	A LUNDY ELECTRONICS	7-18	7 3/8	-3/8	-7.5
N NCR	38-78	43	+2 1/4	+5.5	O IPS COMPUTER MARKET	1-4	1 1/8	0	0.0	A MSI DATA CORP	11-27	16 3/8	-1/4	-1.5
N PRIME COMPUTER INC	18-48	22 1/4	+1 3/8	+5.8	O KEANE ASSOCIATES	4-8	4 1/4	0	0.0	D NETWORK SYSTEMS CORP	14-25	18	-1 3/8	-7.0
N PERKIN-ELMER	21-36	28 3/8	+2 1/8	+8.7	D LOGICON	23-38	31 1/4	+1 3/8	+4.6	D OMEX	2-12	8	0	0.0
N PERRY CORP	30-65	32 1/4	+1 1/4	+6.7	O MINT SCI AMER INC	1-3	1 1/4	-1/4	-1.1	N PARADYNE CORP	25-52	37 3/8	-1/2	-1.3
O TANDEN COMPUTERS INC	13-35	25 1/2	-1 1/2	-5.5	O MATHEMATICA INC	12-24	23 1/2	+3	+14.6	D PERIL CORP	8-17	8 3/8	-1/2	-5.8
N TEXAS INSTRUMENTS	71-151	78 7/8	+3 7/8	+5.1	O MATHEMATICAL APP GRP	15-20	15 1/2	0	0.0	O RARTEK CORP	9-23	13	+1/8	+0.9
A WANG LABS.	23-46	28 1/2	-1 1/8	-0.4	O NATIONAL DATA CORP	14-28	17 3/8	-1 3/8	-7.2	N RECOGNITION EQUIP	5-21	5 1/8	-3/4	-12.7
					N PLANNING RESEARCH	3-13	6 5/8	+5/8	+10.4	O SCAN DATA	1-5	3/4	0	0.0
					O PROGRAMMING & SYS	1-2	1 1/8	0	0.0	N STORAGE TECHNOLOGY	18-40	20 1/2	+1/4	+0.9
					O REYNOLDS & REYNOLD	18-26	18 1/4	0	0.0	O SYKES DATATRONICS	8-34	25 3/4	-1/4	-0.8
					O SEI CORP	17-28	23	0	0.0	A T BAR INC	12-19	14 7/8	+7/8	+6.2
					O STSC INC	6-28	7	+1/2	+6.8	A TEC INC	4-7	6 1/2	+7/8	+15.5
					O SCIENTIFIC COMPUTERS	7-18	7 3/4	-1/2	-6.0	N TEKTRONIX INC	46-70	51 3/8	-1 1/8	-2.1
					O SOFTWARE AG	11-23	11 1/2	-1	-8.0	N TELEX	5-9	7	+1/4	+3.7
					N TYNSHARE INC	18-36	18 1/4	-1 3/8	-6.6	O TESDATA SYSTEMS CP	6-17	6 5/8	-5/8	-8.6
					A URS CORP	11-18	12 1/2	-1	-7.4	A TIMEPLEX INC	8-19	7 3/8	-1 3/8	-15.2
					N WTLY CORP	7-20	8	-1/4	-3.0	O HILTEK INC	1-3	1 7/8	-1/8	-6.2
PERIPHERALS & SUBSYSTEMS														
N AM INTERNATIONAL	4-25	3 3/4	0	0.0						N AMERICAN BUS PRODS	11-17	11 3/4	-1/2	-4.0
A ANDERSON JACOBSON	10-28	11 1/4	-3/4	-3.2						O BALTIMORE BUS FORMS	1-2	1	+1/4	+33.3
O AUTO-TROL TECHNOLOGY	8-22	10 1/2	-1/4	-2.3						N BARRY MIGHT	13-24	18 3/8	0	0.0
O BANCTEC INC	20-35	28	-1/2	-1.8						O CYBERNETICS INC	1-2	1	0	0.0
O BEEHIVE INT'L	6-18	8 7/8	-3/8	-5.1						A DUPLEX PRODUCTS INC	12-17	13 5/8	-1/4	-1.8
A BOLT-BERANER & NEW	9-25	10 3/4	+3/4	+7.5						N ENVIS BUS FORMS	13-23	18 5/8	-1/2	-2.4
O CANEX CORP	2-8	3	+1/8	+4.3						N 3M COMPANY	48-63	54 3/4	-1/8	-0.2
N CENTRONICS DATA CORP	7-40	12 1/4	-1	-7.5						D MOORE CORP LTD	27-38	31 1/4	-3/4	-2.3
CETEC CORP	4-8	4 5/8	+1/4	+5.7						N NASHUA CORP	16-33	18 1/8	-1 5/8	-8.1
O COMPUTER DEVICES INC	4-10	4	+1/8	+1.8						O STANDARD REGISTER	30-41	33 3/4	-1/4	-0.7
O CONITRONICS	3-11	3 3/8	+1/8	+4.1						A TAB PRODUCTS CO	13-30	15 7/8	-3/4	-4.5
O COMPUTER COMMUN.	1-8	7/8	0	0.0						N WALLACE BUS FORMS	22-38	30 3/8	-2	-6.1
SUPPLIES & ACCESSORIES														
N AMERICAN BUS PRODS	11-17	11 3/4	-1/2	-4.0										
O BALTIMORE BUS FORMS	1-2	1	+1/4	+33.3										
N BARRY MIGHT	13-24	18 3/8	0	0.0										
O CYBERNETICS INC	1-2	1	0	0.0										
A DUPLEX PRODUCTS INC	12-17	13 5/8	-1/4	-1.8										
N ENVIS BUS FORMS	13-23	18 5/8	-1/2	-2.4										
N 3M COMPANY	48-63	54 3/4	-1/8	-0.2										
D MOORE CORP LTD	27-38	31 1/4	-3/4	-2.3										
N NASHUA CORP	16-33	18 1/8	-1 5/8	-8.1										
O STANDARD REGISTER	30-41	33 3/4	-1/4	-0.7										
A TAB PRODUCTS CO	13-30	15 7/8	-3/4	-4.5										
N WALLACE BUS FORMS	22-38	30 3/8	-2	-6.1										
EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH; B=BOEING L=LONG ISLAND; M=MIDWEST; O=OVER-THE-COUNTER O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LATEST BID														

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH; B=BOSTON
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
D-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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Looking for a quiet, tough printer system? Southern Systems has it. The QT Family.



People have been talking about The QT for a long time. They didn't call it The QT, of course. They just talked about the ideal line printer system — one that would be both durable and easy to operate, a low-cost system with great versatility and dependability. Give us a line printer system, they said, with one answer to my most important needs:

Ask About
SSI's New
Letter-Quality
Printers

YES

- ☒ Do the QT printer systems give me a choice of 300, 600, 1000 & 1200 lpm?
- ☒ Does the QT family set the standard for quietness?
- ☒ Are they built for production DP applications?
- ☒ Are the bands heavy duty steel?
Operator changeable?
- ☒ Are they easy to maintain?
- ☒ Is the print quality top-caliber?
- ☒ Is there a diagnostic display? Internal self test?
- ☒ Towel ribbon? Forms alignment?
Membrane touch control?
- ☒ Does SSI guarantee compatibility with my computer?
- ☒ Is service available nationwide?
- ☒ Is the QT line printer family affordable and cost-effective?



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☐ Parallel interfacing ☐ Serial interfacing (Synchronous or asynchronous)

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Company _____

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